DVP-S350
RMT-D116A

SERVICE MANUAL

US Model

Self Diagnosis Supported model

SPECIFICATIONS

CD/DVD player

Laser Semiconductor laser
Signal format system
  NTSC

Audio characteristics

Frequency response
  DVD (PCM 96 kHz): 2 Hz to 44 kHz (±1 dB)*
  DVD (PCM 48 kHz): 2 Hz to 22 kHz (±0.5 dB)
  CD: 2 Hz to 20 kHz (±0.5 dB)
Signal-to-noise ratio
  More than 110 dB (AUDIO OUT connectors only)
Harmonic distortion
  Less than 0.003 %
Dynamic range
  More than 100 dB (DVD)
  More than 97 dB (CD)
Wow and flutter
  Less than detected value (±0.001 % W PEAK)

Outputs

	Jack type	Output level	Load impedance
AUDIO OUT	Phono jacks	2 Vrms (at 50 kilohms)	Over 10 kilohms
DIGITAL OUT (OPTICAL)	Optical output connector	–18 dBm	Wave length: 660 nm
DIGITAL OUT (COAXIAL)	Phono jack	0.5 Vp-p	75 ohms terminated
VIDEO OUT	Phono jack	1.0 Vp-p	75 ohms, sync negative
S VIDEO OUT	4-pin mini DIN	Y: 1.0 Vp-p C: 0.286 Vp-p	75 ohms, sync negative 75 ohms terminated
COMPONENT VIDEO OUT (Y, PB/B-Y, PR/R-Y)	Phono jacks	Y: 1.0 Vp-p PB/B-Y, PR/R-Y: 0.7 Vp-p	75 ohms, sync negative 75 ohms

General

Power requirements
  120 V AC, 60 Hz
Power consumption
  13 W
Dimensions (approx.)
  430 × 69 × 252 mm
  (17 × 2 3/4 × 10 in.) (w/h/d)
  incl. projecting parts
Mass (approx.)
  2.8 kg (6 lb 3 oz)
Operating temperature
  41 ˚F to 95 ˚F
  (5 ˚C to 35 ˚C)
Operating humidity
  25 % to 80 %

Supplied accessories

- Audio/video connecting cord (1)
- Remote commander (remote) (1)
- Size AA (R6) batteries (2)

* *The signals from AUDIO OUT connectors are measured. When you play PCM sound tracks with a 96 kHz sampling frequency, the output signals from the DIGITAL OUT (OPTICAL, COAXIAL) are converted to 48 kHz (sampling frequency).*

Design and specifications are subject to change without notice.

CD/DVD PLAYER

SONY®

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
5. Check the line cord for cracks and abrasion. Recommend the replacement of any such line cord to the customer.
6. Check the B+ voltage to see it is at the values specified.
7. Check the antenna terminals, metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 0.5 mA (500 microamperes). Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 0.75V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 2V AC range are suitable. (See Fig. A)

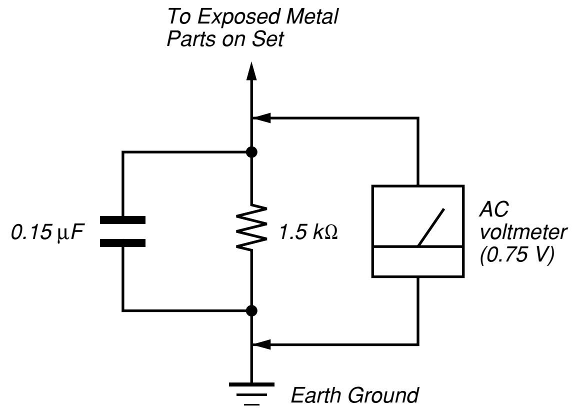


Fig. A. Using an AC voltmeter to check AC leakage.

WARNING!!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMISSION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 25 cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.

CAUTION:

The use of optical instrument with this product will increase eye hazard.

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

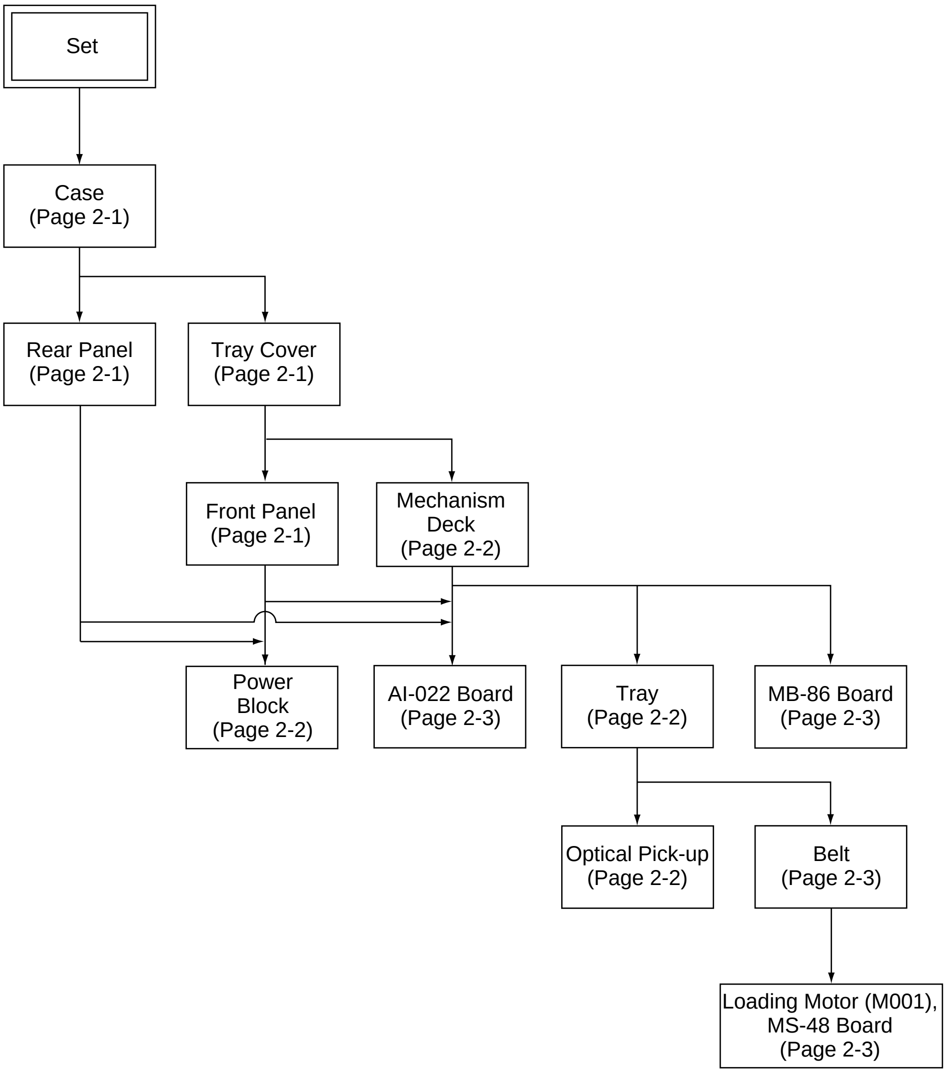
TABLE OF CONTENTS

Section	Title	Page
Service Note		4
1.	**GENERAL**	
	Getting Started	1-1
	Playing Discs	1-4
	Using Various Functions with the Control Menu	1-6
	Settings and Adjustments	1-10
2.	**DISASSEMBLY**	
2-1.	Case Removal	2-1
2-2.	Rear Panel Removal	2-1
2-3.	Tray Cover Removal	2-1
2-4.	Front Panel Removal	2-1
2-5.	Power Block Removal	2-2
2-6.	Mechanism Deck Removal	2-2
2-7.	Tray Removal	2-2
2-8.	Optical Pick-up Removal	2-2
2-9.	Belt, MB-86 Board, Loading Motor (M001), MS-48 Board Removal	2-3
2-10.	AI-022 Board Removal	2-3
2-11.	Internal Views	2-4
2-12.	Circuit Boards Location	2-5
3.	**BLOCK DIAGRAMS**	
3-1.	Overall Block Diagram	3-1
3-2.	RF/Servo Block Diagram	3-3
3-3.	Signal Processor Block Diagram	3-5
3-4.	Video/Audio Block Diagram	3-7
3-5.	System Control Block Diagram	3-9
3-6.	Interface Control Block Diagram	3-11
3-7.	Power Block Diagram	3-13
4.	**PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS**	
4-1.	Frame Schematic Diagram	4-3
4-2.	Printed Wiring Boards and Schematic Diagrams	4-5
	MS-48 Printed Wiring Board and Schematic Diagram	4-5
	MB-86 Printed Wiring Board	4-7
	MB-86 (RF AMP, SERVO) Schematic Diagram	4-11
	MB-86 (ARP) Schematic Diagram	4-13
	MB-86 (AV DECODER) Schematic Diagram	4-15
	MB-86 (SDRAM) Schematic Diagram	4-17
	MB-86 (DRIVE) Schematic Diagram	4-19
	MB-86 (SERVO DSP) Schematic Diagram	4-21
	MB-86 (SYSTEM CONTROL) Schematic Diagram	4-23
	MB-86 (MEMORY, CLOCK GENERATOR) Schematic Diagram	4-25
	AI-022 Printed Wiring Board	4-27
	AI-022 (VIDEO BUFFER) Schematic Diagram	4-29
	AI-022 (D/A CONVERTER, DSP) Schematic Diagram	4-31
	AI-022 (POWER SUPPLY) Schematic Diagram	4-33
	AI-022 (IF CON) Schematic Diagram	4-35
	FR-177, FL-118 Printed Wiring Boards and Schematic Diagrams	4-37
	HS16S9U Printed Wiring Board	4-39
	HS16S9U Schematic Diagram	4-41
5.	**IC PIN FUNCTION DESCRIPTION**	
5-1.	System Control Pin Function (MB-86 Board IC102)	5-1
6.	**TEST MODE**	
6-1.	General Description	6-1
6-2.	Starting Test Mode	6-1
6-3.	Syscon Diagnosis	6-1
6-4.	Drive Auto Adjustment	6-5
6-5.	Drive Manual Operation	6-7
6-6.	Mecha Aging	6-9
6-7.	Emergency History	6-9
6-8.	Version Information	6-10
6-9.	Video Level Adjustment	6-10
6-10.	If Con Self Diagnostic Function	6-11
7.	**ELECTRICAL ADJUSTMENT**	
7-1.	Power Supply Adjustment	7-1
1.	Power Supply Check	7-1
7-2.	Adjustment of Video System	7-2
1.	Video Level Adjustment	7-2
2.	S-terminal Output Check	7-2
3.	Checking Component Video Output B-Y	7-2
4.	Checking Component Video Output R-Y	7-2
5.	Checking Component Video Output Y	7-3
6.	Checking S Video Output S-C	7-3
7-3.	Adjustment Related Parts Arrangement	7-4
8.	**REPAIR PARTS LIST**	
8-1.	Exploded Views	8-1
8-1-1.	Case Assembly	8-1
8-1-2.	Chassis Assembly	8-2
8-1-3.	Mechanism Deck Section	8-3
8-2.	Electrical Parts List	8-4

SERVICE NOTE

1. DISASSEMBLY

- This set can be disassembled in the order shown below.



2. DISC REMOVAL PROCEDURE (at POWER OFF)

1) Insert a tapering driver into the aperture of the unit bottom, and move the lever of chuck cam in the direction of the arrow Ⓐ. (See Fig. 1)
2) Draw out the tray in the direction of the arrow Ⓑ, and remove a disc. (See Fig. 1)

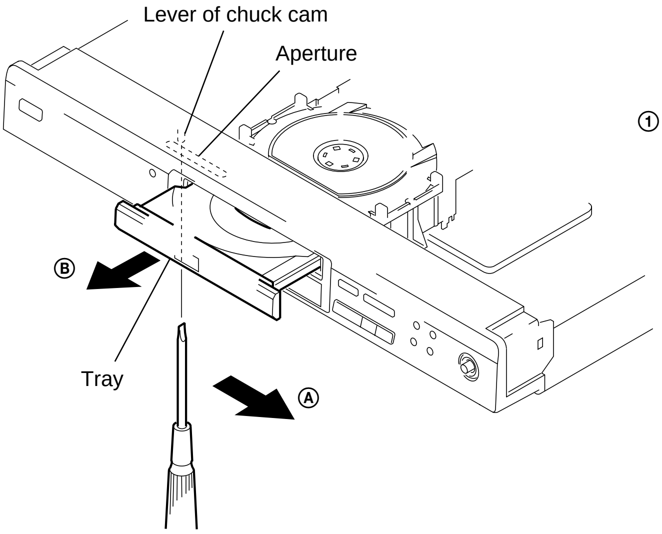


Fig. 1

3. HOW TO SERVICE MB-86 BOARD

1) Remove the case from the set. (Refer to 2-1)
2) Remove the mechanism deck. (Refer to 2-2)
3) Remove the MB-86 board. (Refer to 2-3)
4) Set the CK-MD board as shown in Fig. 2.

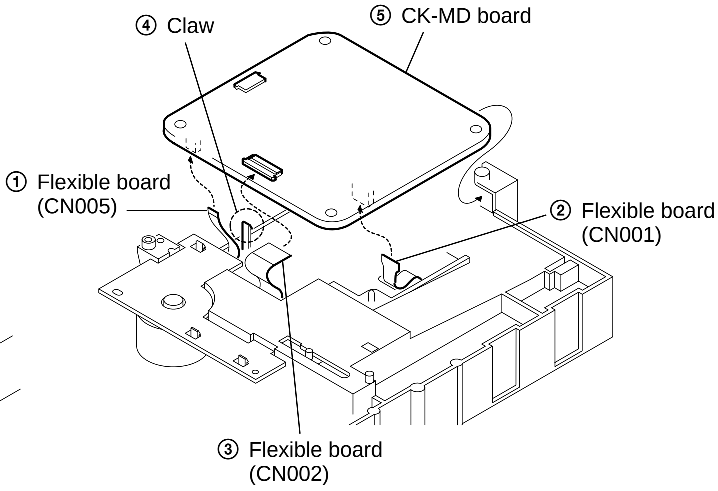


Fig. 2

5) Set the MB-86 board as shown in Fig. 3.

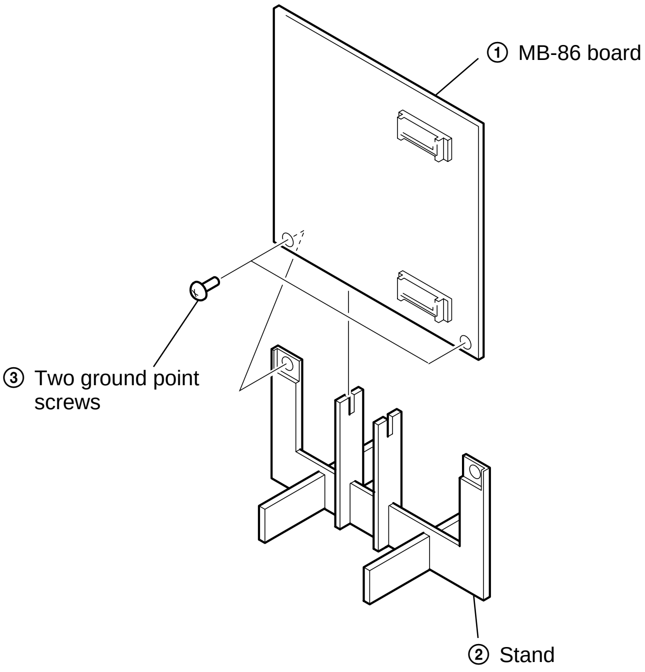


Fig. 3

6) Set the CK-MB board as shown in Fig. 4.

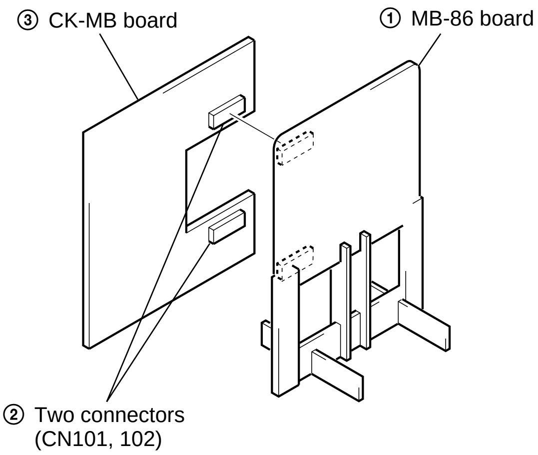


Fig. 4

7) Set the CK-AI board as shown in Fig. 5.

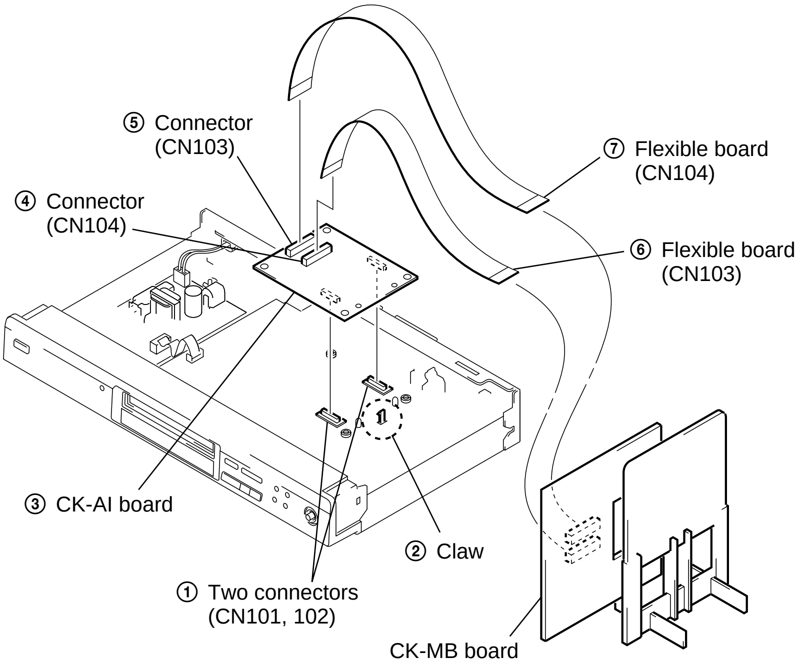


Fig. 5

8) Set the mechanism deck as shown in Fig. 6.

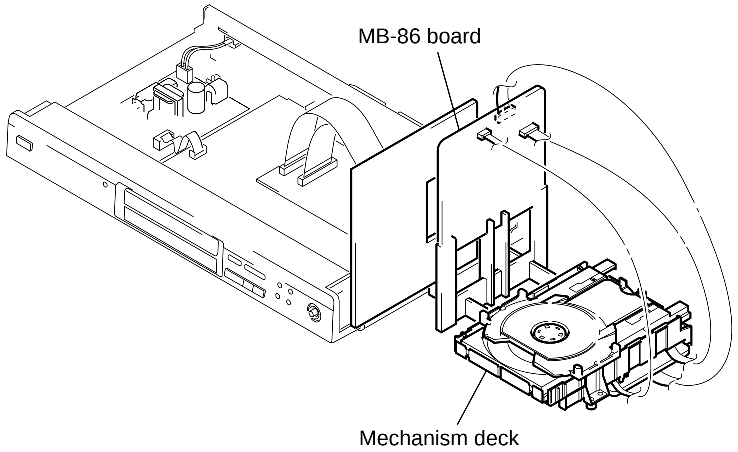


Fig. 6

SECTION 1 GENERAL

This section is extracted from instruction manual (3-062-657-11).

About This Manual

Conventions
- Instructions in this manual describe the controls on the player. You can also use the controls on the remote if they have the same or similar names as those on the player.
- The icons on the right are used in this manual:

Icon	Meaning
	Indicates that you can use only the remote to do the task.
	Indicates tips and hints for making the task easier.
DVD	Indicates that the function is for DVD VIDEOs.
VIDEO CD	Indicates that the function is for VIDEO CDs.
CD	Indicates that the function is for Audio CDs.

This Player Can Play the Following Discs

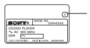
	DVD VIDEOs		VIDEO CDs		Audio CDs	
Disc logo						
Contents	Audio + Video		Audio + Video		Audio	
Disc size	12 cm	8 cm	12 cm	8 cm	12 cm	8 cm (CD single)
Play time	About 4 h (for single-sided DVD)/ about 8 h (for double-sided DVD)	About 80 min. (for single-sided DVD)/ about 160 min. (for double-sided DVD)	74 min.	20 min.	74 min.	20 min.

The "DVD VIDEO" logo is a trademark.

This player conforms to the NTSC color system. You cannot play discs recorded in other color systems such as PAL or SECAM.

Region code of DVDs you can play on this unit

Your DVD player has a region code printed on the back of the unit and will only play DVDs that are labeled with identical region codes.



DVDs labeled [ALL] will also play on this unit.

If you try to play any other DVD, the message "Playback prohibited by area limitations." will appear on the TV screen.

Depending on the DVD, no region code indication may be labeled even though playing the DVD is prohibited by area restrictions.

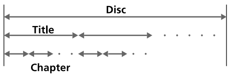
Note on playback operations of DVDs and VIDEO CDs

Some playback operations of DVDs and VIDEO CDs may be intentionally fixed by software producers. Since this player plays DVDs and VIDEO CDs according to the disc contents the software producers designed, some playback features may not be available. Also refer to the instructions supplied with the DVDs or VIDEO CDs.

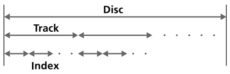
Terms for discs

- Title
  The longest section of a picture or music feature on a DVD, the movie, etc. in video software, or the name of an album in audio software.
- Chapter
  Sections of a picture or a music feature that are smaller than titles. A title is composed of several chapters. Each chapter is assigned a chapter number enabling you to locate the chapter you want. Depending on the disc, no chapters may be recorded.
- Track
  Sections of a picture or a music feature on a VIDEO CD or a CD. Each track is assigned a track number enabling you to locate the track you want.

DVD structure



VIDEO CD or CD structure



- Index (CD) / Video Index (VIDEO CD)
  A number that divides a track into sections to easily locate the point you want on a VIDEO CD or a CD. Depending on the disc, no indexes may be recorded.
- Scene
  On a VIDEO CD with PBC (playback control) functions, the menu screens, moving pictures and still pictures are divided into sections called "scenes." Each scene is assigned a scene number enabling you to locate the scene you want.

Note on PBC (Playback Control) (VIDEO CDs)

This player conforms to Ver. 1.1 and Ver. 2.0 of VIDEO CD standards. You can enjoy two kinds of playback according to the disc type.

Disc type	You can
VIDEO CDs without PBC functions (Ver. 1.1 discs)	Enjoy video playback (moving pictures) as well as music.
VIDEO CDs with PBC functions (Ver. 2.0 discs)	Play interactive software using menu screens displayed on the TV screen (PBC Playback), in addition to the video playback functions of Ver. 1.1 discs. Moreover, you can play high-resolution still pictures if they are included on the disc.

Discs that the player cannot play

The player cannot play discs other than the ones listed in the table on page 4. CD-Rs, CD-ROMs including PHOTO CDs, data sections in CD-EXTRAs, DVD-ROMs, DVD-audio, HD (high density) layer of Super Audio CD etc., cannot be played.

When playing DTS*-encoded CDs, excessive noise will be heard from the analog stereo outputs. To avoid possible damage to the audio system, the consumer should take proper precautions when the analog stereo outputs of the DVD player are connected to an amplification system. To enjoy DTS Digital Surround™ playback, an external 5.1-channel DTS Digital Surround™ decoder system must be connected to the digital output of the DVD player.

This product incorporates copyright protection technology that is protected by method claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners. Use of this copyright protection technology must be authorized by Macrovision Corporation, and is intended for home and other limited viewing uses only unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.

* "DTS" is a trademark of Digital Theater Systems, Inc.

Precautions

On safety
- Caution – The use of optical instruments with this product will increase eye hazard.
- Should any solid object or liquid fall into the cabinet, unplug the player and have it checked by qualified personnel before operating it any further.

On power sources
- The player is not disconnected from the AC power source (mains) as long as it is connected to the wall outlet, even if the player itself has been turned off.
- If you are not going to use the player for a long time, be sure to disconnect the player from the wall outlet. To disconnect the AC power cord (mains lead), grasp the plug itself; never pull the cord.
- Should the AC power cord (mains lead) need to be changed, have it done at a qualified service shop only.

On placement
- Place the player in a location with adequate ventilation to prevent heat build-up in the player.
- Do not place the player on a soft surface such as a rug that might block the ventilation holes on the bottom.
- Do not place the player in a location near heat sources, or in a place subject to direct sunlight, excessive dust or mechanical shock.

On operation
- If the player is brought directly from a cold to a warm location, or is placed in a very damp room, moisture may condense on the lenses inside the player. Should this occur, the player may not operate properly. In this case, remove the disc and leave the player turned on for about half an hour until the moisture evaporates.
- When you move the player, take out any discs. If you don't, the disc may be damaged.

On adjusting volume
- Do not turn up the volume while listening to a section with very low level inputs or no audio signals. If you do, the speakers may be damaged when a peak level section is played.

On cleaning
- Clean the cabinet, panel and controls with a soft cloth slightly moistened with a mild detergent solution. Do not use any type of abrasive pad, scouring powder or solvent such as alcohol or benzine.

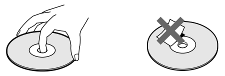
If you have any questions or problems concerning your player, please consult your nearest Sony dealer.

IMPORTANT NOTICE

Caution: The enclosed DVD player is capable of holding a still video image or on-screen display image on your television screen indefinitely. If you leave the still video image or on-screen display image displayed on your TV for an extended period of time you risk permanent damage to your television screen. Projection televisions are especially susceptible to this.

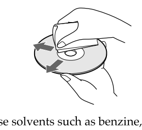
Notes About the Discs

On handling discs
- To keep the disc clean, handle the disc by its edge. Do not touch the surface.
- Do not stick paper or tape on the disc.
  If there is glue (or a similar substance) on the disc, remove the glue completely before using the disc.



- Do not expose the disc to direct sunlight or heat sources such as hot air ducts, or leave it in a car parked in direct sunlight as the temperature may rise considerably inside the car.
- After playing, store the disc in its case.

On cleaning
- Before playing, clean the disc with a cleaning cloth. Wipe the disc from the center out.



- Do not use solvents such as benzine, thinner, commercially available cleaners or anti-static spray intended for vinyl LPs.

On novelty discs
- Do not use irregularly shaped CDs such as heart- or star-shaped CDs as they may cause the player to malfunction.

Getting Started

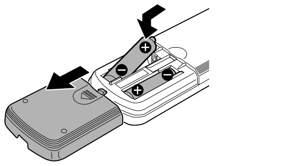
This section describes how to hook up the CD/DVD player to a TV (with audio/video input jacks) and/or an AV receiver (amplifier). You cannot connect this player to a TV which does not have a video input connector. Be sure to turn off the power of each component before making the connections.

Unpacking

Check that you have the following items:
- Audio/video connecting cord (1)
- Remote commander (remote) (1)
- Size AA (R6) batteries (2)

Inserting batteries into the remote

You can control the player using the supplied remote. Insert two Size AA (R6) batteries by matching the + and – ends on the batteries to the markings inside the compartment. When using the remote, point it at the remote sensor on the player.



You can control TVs or AV receivers (amplifiers) using the supplied remote
See page 53.

Notes
- Do not leave the remote in an extremely hot or humid place.
- Do not drop any foreign object into the remote casing, particularly when replacing the batteries.
- Do not expose the remote sensor to direct sunlight or lighting apparatuses. Doing so may cause a malfunction.
- If you do not use the remote for an extended period of time, remove the batteries to avoid possible damage from battery leakage and corrosion.

TV Hookups

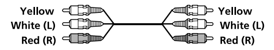
This connection is for listening to the sound through TV speakers (L: left, R: right). Refer to the instructions supplied with the component to be connected.

You can enjoy surround sound using your TV's built-in speakers

You can use 3D sound imaging to create virtual rear speakers from the sound of built-in TV speakers without using actual rear speakers (VES TV: Virtual Enhanced Surround TV). For details, see page 33.

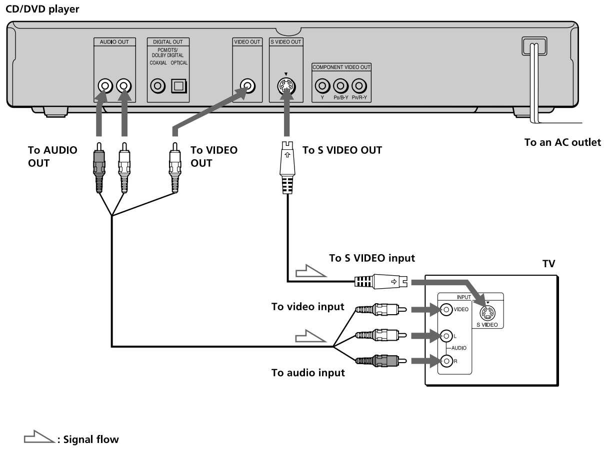
Required cords

Audio/video connecting cord (supplied) (1)



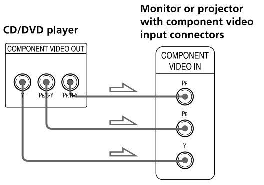
S video cord (not supplied) (1)

When connecting the cords, be sure to match the color-coded cord to the appropriate jacks on the components: Yellow (video) to Yellow, Red (right) to Red and White (left) to White. Be sure to make connections firmly to avoid hum and noise.
If your TV has an S video input connector, connect the component via the S VIDEO OUT connector using an S video cord (not supplied). You will get a better picture.
Refer to the instructions supplied with the TV to be connected.

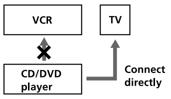


If you connect the player to a monitor or projector having component video input connectors that conform to output signals from the COMPONENT VIDEO OUT (Y, PB/B-Y, PR/R-Y) connectors on the player

Connect the component via the COMPONENT VIDEO OUT connectors using three video connecting cords (not supplied) of the same kind. You will get a better picture.



Notes
- Refer to the instructions supplied with the component to be connected.
- Do not connect this player to a video deck. If you do, noise may appear in the picture.



- Depending on the TV or receiver (amplifier), sound distortion may occur because the audio output level is high. In this case, set "AUDIO ATT" in "AUDIO SETUP" to "ON" in the setup display. For details, see page 51.

Setups for the player

Some setup adjustments are necessary for the player depending on the TV or other components to be connected.
Use the setup display to change the various settings.
For details on using the setup display, see page 43.

- **To connect the player to a normal TV**
  In the setup display, set "TV TYPE" in "SCREEN SETUP" to "4:3 LETTER BOX" (default setting) or "4:3 PAN SCAN." For details, see page 47.
- **To connect the player to a TV having the WIDE MODE function**
  In the setup display, set "TV TYPE" in "SCREEN SETUP" to "16:9/4:3 WIDE MODE." For details, see page 47.
- **To connect the player to a wide-screen TV**
  In the setup display, set "TV TYPE" in "SCREEN SETUP" to "16:9/4:3 WIDE MODE." For details, see page 47.

Receiver (Amplifier) Hookups

This connection is for listening to the sound through speakers connected to a receiver lacking a built-in DTS or Dolby* Digital decoder. Refer as wel to the instructions supplied with the component to be connectedl.

You can enjoy surround sounds even if you connect front speakers only

You can use 3D sound imaging to create virtual rear speakers from the sound of the front speakers (L, R) without using actual rear speakers (VES:Virtual Enhanced Surround). For details, see page 33.

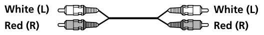
If you have a digital component with a built-in DTS or Dolby Digital decoder

You can enjoy multi-channel surround sound by connecting the component via the DIGITAL OUT OPTICAL or COAXIAL connector using an optical or coaxial digital connecting cord (not supplied). For details on hookups and settings, see page 12.

* Manufactured under license from Dolby Laboratories. "Dolby", "Pro Logic" and the double-D symbol are trademarks of Dolby Laboratories.
Confidential unpublished works. ©1992-1997 Dolby Laboratories. All rights reserved.

Required cords

Audio connecting cord (not supplied) (1)

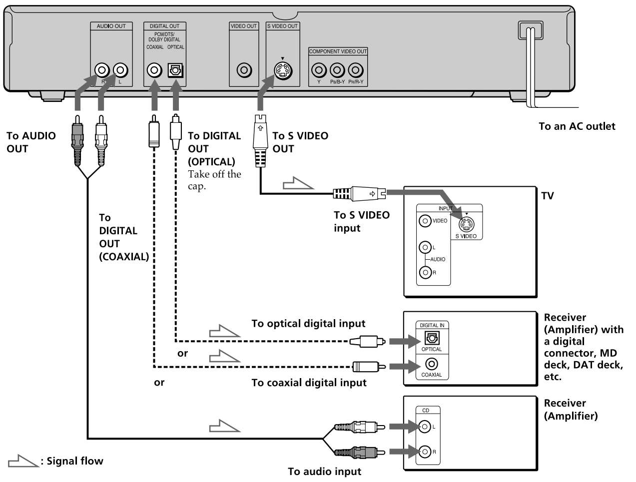


S video cord (not supplied) (1)

When connecting the cords, be sure to match the color-coded cord to the appropriate jacks on the components: Red (right) to Red and White (left) to White. Be sure to make connections firmly to avoid hum and noise.
If you have a digital component such as a receiver (amplifier) with a digital connector, DAT or MD, connect the component via the DIGITAL OUT OPTICAL or COAXIAL connector using an optical or coaxial digital connecting cord (not supplied).

Optical digital connecting cord (not supplied) (1)

Coaxial digital connecting cord (not supplied) (1)



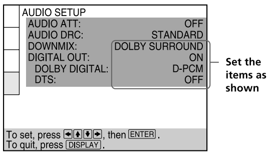
Notes
- You cannot enjoy a picture with an S video signal if your TV does not conform to the S video signal. When your TV does not have an S VIDEO input, connect the component via the VIDEO INPUT connector using the audio/video connecting cord (supplied) instead of the S video cord. For details, see page 8.
  Refer to the instructions supplied with your TV.
- Refer to the instructions supplied with the component to be connected.
- You cannot make digital audio recordings of discs recorded in multi-channel surround format directly using an MD deck or DAT deck.
- When you connect the component via the DIGITAL OUT OPTICAL or COAXIAL connector, set Virtual Enhanced Surround (VES) to "OFF." Otherwise, the player will not output signals from the DIGITAL OUT OPTICAL or COAXIAL connector, if you set "DOLBY DIGITAL" in "AUDIO SETUP" to "D-PCM."

When you have made the connections using an optical or coaxial digital connecting cord, do not set "DOLBY DIGITAL" to "DOLBY DIGITAL" and "DTS" to "ON." If you do, a loud noise will suddenly come out from the speakers, affecting your ears or causing the speakers to be damaged.

Setups for the player

Some setup adjustments are necessary for the player depending on the components to be connected.
Use the setup display to change the various settings.
For details on using the setup display, see page 43.

- **To listen to the sound through speakers connected to a receiver (amplifier) which has a digital connector and lacks a built-in DTS or Dolby Digital decoder, or to output the sound to a digital component such as a DAT or MD deck**
  Set the "AUDIO SETUP" items in the setup display (page 51) as shown in the illustration below. These are the default settings.



Set "VES" to "OFF" in the Control Menu display (page 33). When you select any VES mode other than "OFF," no sound will come from the speakers.

Note
When you output the signals which do not reproduce the Dolby Surround (Pro Logic) effect from the DIGITAL OUT OPTICAL or COAXIAL connector, set "DOWNMIX" to "NORMAL" in "AUDIO SETUP" in the setup display (page 52).

5.1 Channel Surround Hookups

With DVDs which contain DTS or Dolby Digital sound, you can enjoy the surround sound while producing the effect of being in a movie theater or a concert hall using a digital component with a built-in DTS or Dolby Digital decoder (not supplied). The player outputs the surround sound signals from the DIGITAL OUT OPTICAL and COAXIAL connectors.
Using a receiver (amplifier) having the OPTICAL or COAXIAL connector and 6 speakers, you can enjoy even greater real audio presence in the comfort of your own home.

Required cords

Optical digital connecting cord* (not supplied) (1)

Coaxial digital connecting cord* (not supplied) (1)

S video cord (not supplied) (1)

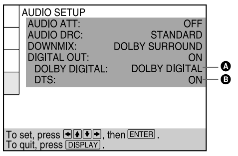
* Connect the component via the DIGITAL OUT OPTICAL or COAXIAL connector using an optical or coaxial digital connecting cord (not supplied). You do not need to connect both of these cords. See the figure on the next page.

Notes
- Do not connect the power cord to an AC outlet or press the POWER switch before completing all connections.
- Refer to the instructions supplied with the component to be connected.
- The cord connectors should be fully inserted into the jacks. A loose connection may cause hum and noise.

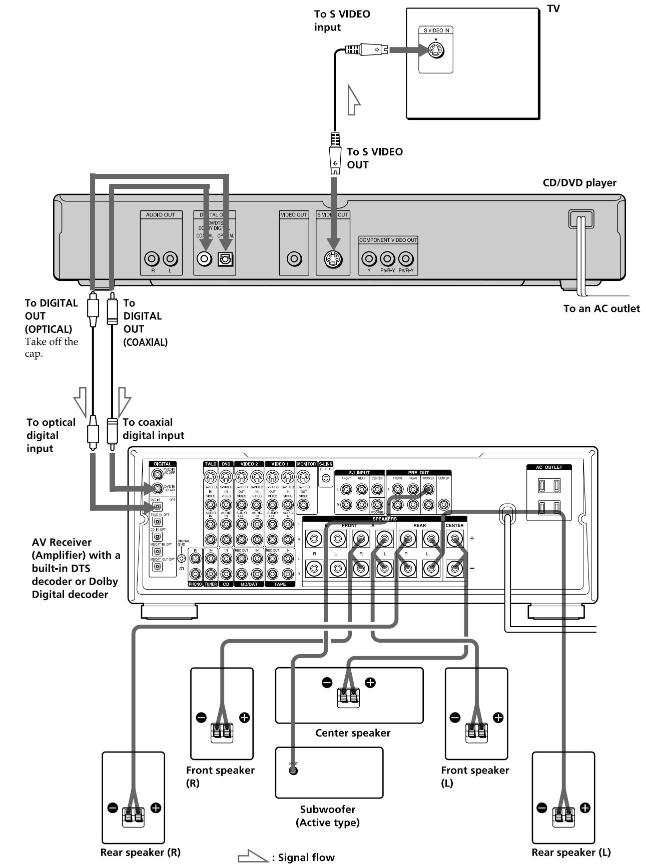
Setups for the player

Some setup adjustments are necessary for the player depending on the components to be connected.
Use the setup display to change the various settings.
For details on using the setup display, see page 43.

- **When you connect an audio component with a built-in Dolby Digital decoder Ⓐ**
  Set "DIGITAL OUT" in "AUDIO SETUP" to "ON" and then set "DOLBY DIGITAL" to "DOLBY DIGITAL" in the setup display. (page 52)
- **When you connect an audio component with a built-in DTS decoder Ⓑ**
  Set "DIGITAL OUT" in "AUDIO SETUP" to "ON" and then set "DTS" to "ON" in the setup display. (page 52)

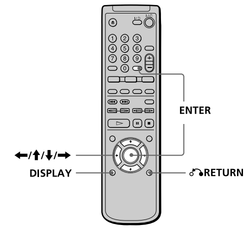


Notes
- **When you do not connect an audio component with a built-in Dolby Digital decoder, do not set "DOLBY DIGITAL" to "DOLBY DIGITAL."**
- **When you do not connect an audio component with a built-in DTS decoder, do not set "DTS" to "ON."**

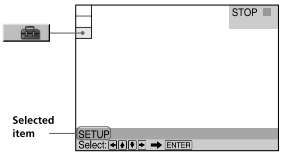


Selecting the Language for the On-Screen Display

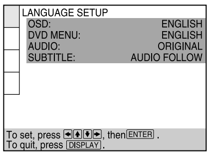
You can select the language for the setup display, the Control Menu display or the messages displayed on the screen. The default setting is "ENGLISH."



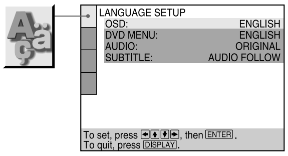
1 When the player is in stop mode, press DISPLAY and select "SETUP" using ↑/↓.
The on-screen menu items are different depending on whether there is a disc in the player or not.



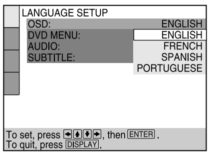
2 Press ENTER.
The setup display appears on the TV screen.



3 Select "LANGUAGE SETUP" using ↑/↓, and then press ENTER.



4 Select "OSD" using ↑/↓, then press → or ENTER.
The languages you can select are displayed.



5 Select the desired language using ↑/↓, then press ENTER.

6 Press DISPLAY.
The setup display disappears.

7 Press DISPLAY repeatedly to turn off the on-screen menu.

To return to the previous screen
Press RETURN.

To quit while making a selection
Press DISPLAY.

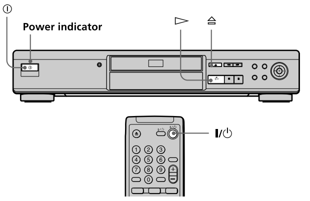
Note
The languages you can select are the ones displayed in step 4.
For details, see page 46.

Playing Discs

This chapter describes how to play a DVD/CD/VIDEO CD.

Playing Discs DVD VIDEO CD CD

Depending on the DVD or VIDEO CD, some operations may be different or restricted. Refer to the instructions supplied with your disc.

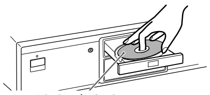


1 Turn on your TV.
Turn on the TV and select the video input so that you can view the pictures from this player.

When using a receiver (amplifier)
Turn on the receiver (amplifier) and select the appropriate position so that you can listen to the sound from this player.

2 Press ⏻ on the player.
The player enters standby mode and the power indicator lights up in red.

3 Press ⏏ on the player, and place a disc on the disc tray.
The player automatically turns on and the power indicator lights up in green.



4 Press ▷.
The disc tray closes and the player starts playback (continuous play). Adjust the volume on the TV or the receiver (amplifier).

After following Step 4

■ When playing a DVD
A DVD menu or title menu may appear on the TV screen (see page 20).

■ When playing a VIDEO CD
A menu may appear on the TV screen depending on the VIDEO CD. You can play the disc interactively, following the instructions on the menu. (PBC Playback, see page 21.)

To turn on the player
Press ⏻ on the player. The player enters standby mode and the power indicator lights up in red.
Then press I/⏻ on the remote. The player turns on and the power indicator lights up in green. In standby mode, the player also turns on by pressing ⏏ on the player or by pressing ▷.

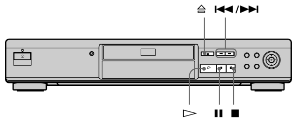
To turn off the player
Press I/⏻ on the remote. The player enters standby mode and the power indicator lights up in red.
To disconnect the power of the player, press ⏻ on the player.

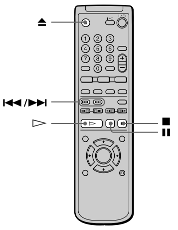
Notes on playing DTS sound tracks on a CD
- Do not play DTS sound tracks without first connecting the player to an audio component having a built-in DTS decoder. The player outputs the DTS signal via the DIGITAL OUT OPTICAL and COAXIAL connectors even if "DTS" in "AUDIO SETUP" is set to "OFF" in the setup display, and may affect your ears or cause your speakers to be damaged.
- Set the sound to "STEREO" when you play DTS sound tracks on a CD. (See "Changing the Sound" on page 30.) If you set the sound to "1/L" or "2/R," no sound will come from the DIGITAL OUT OPTICAL and COAXIAL connectors.
- If you play a CD with a DTS sound track, a loud noise may come out from the AUDIO OUT connectors, affecting your ears or causing the speakers to be damaged.

Notes on playing DTS sound tracks on a DVD
The signals of the DTS sound tracks are output from the DIGITAL OUT OPTICAL and COAXIAL connectors only. No sound will be output from the AUDIO OUT connectors.
- If the player is connected to an audio component lacking a built-in DTS decoder, do not set "DTS" in "DIGITAL OUT" to "ON" in the setup display. Otherwise, when you play the DTS sound track, a loud noise will come out from the speakers, affecting your ears or causing the speakers to be damaged.
- When you set "DTS" in "AUDIO SETUP" to "OFF," no sound will come out from the DIGITAL OUT OPTICAL and COAXIAL connectors even if you play DTS sound tracks on DVDs.

Notes
- If you leave the player or the remote in pause or stop mode for 15 minutes, the screen saver image appears automatically. To make the screen saver image go away, press ▷. (If you want to set the screen saver function to off, see page 47.)
- While playing a disc, do not turn off the player by pressing ⏻. Doing so may cancel the settings of the menu. When you turn off the player, press ■ first to stop playback and then press I/⏻ on the remote. After the power indicator lights up in red and the player enters standby mode, press ⏻ on the player.

Additional operations



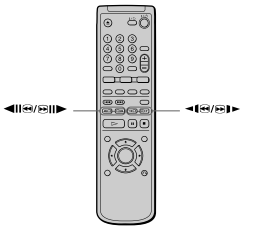


To	Operation
Stop	Press ■
Pause	Press II
Resume play after pause	Press II or ▷
Go to the next chapter, track or scene in continuous play mode	Press ⏭
Go back to the preceding chapter, track or scene in continuous play mode	Press ⏮
Stop play and remove the disc	Press ⏏

You can play discs in various modes such as Program Play using the on-screen menu (Control Menu). For Control Menu operations, see page 24.

Searching for a Particular Point on a Disc DVD VIDEO CD CD

You can locate a particular point on a disc at the desired speed by monitoring the picture.



Note
Depending on the DVD/VIDEO CD, you may not be able to do some of the operations described.

Locating a point quickly (Search)

While a disc is playing, keep pressing ⏩II▶ to locate a point in playback direction at the FF1▶▶* speed or keep pressing ◀II⏪ to locate a point in opposite direction at the FR1◀◀* speed. When you find the point you want, release the button to return to normal speed playback.

* The FF1▶▶/FR1◀◀ playback speed is the one of the scan speed described below.

Locating a point quickly by playing a disc in fast forward or fast reverse (Scan)

While a disc is playing, press ⏩▶ to locate a point in playback direction, or press ◀⏪ to locate a point in opposite direction. When you find the point you want, press ▷ to return to normal speed playback.
Each time you press the ◀⏪ or ⏩▶ button during Scan, the playback speed changes. Three speeds are available. With each press, the display changes as follows:

Playback direction
x2▶ (DVD/CD only) → FF1▶▶ → FF2▶▶
↑_________________________|

Opposite direction
x2◀ (DVD only) → FR1◀◀ → FR2◀◀
↑_________________________|

The x2▶/x2◀ playback speed is about twice the normal speed.
The FF2▶▶/FR2◀◀ playback speed is faster than FF1▶▶/FR1◀◀.

Locating a point slowly by watching the screen (Slow-motion Play) DVD VIDEO CD

You can use this function only for DVDs or VIDEO CDs. When the player is in the pause mode, press ⏩I▶ to locate a point in playback direction, or press ◀I⏪ to locate a point in opposite direction. When you find the point you want, press ▷ to return to the normal speed playback.
Each time you press the ◀I⏪ or ⏩I▶ button during Slow-motion play, the playback speed changes. Two speeds are available. With each press, the display changes as follows:

Playback direction
SLOW1I▶ ←→ SLOW2I▶

Opposite direction (DVD only)
SLOW1◀I ←→ SLOW2◀I

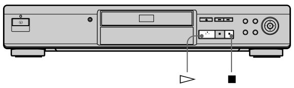
The SLOW2I▶/SLOW2◀I playback speed is slower than SLOW1I▶/SLOW1◀I.

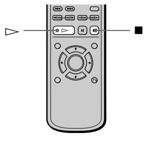
Playing a disc frame by frame DVD VIDEO CD

You can use this function only for DVDs or VIDEO CDs. When the player is in the pause mode, press ⏩II▶ to go to the next frame. Press ◀II⏪ to return to the preceding frame (DVD only). To return to normal playback, press ▷.

Resuming Playback from the Point Where You Stopped the Disc (Resume Play) DVD VIDEO CD CD

The player remembers the point where you stopped the disc and when "RESUME" appears on the front panel display, you can resume playback from that point.
As long as you do not open the disc tray, Resume Play will work even if the player enters standby mode by pressing I/⏻ on the remote.





1 While playing a disc, press ■ to stop playback.
"RESUME" appears on the front panel display and "Disc will restart from current point. To start from beginning, press STOP again." appears on the TV screen.
If "RESUME" does not appear, Resume Play is not available.

2 Press ▷.
The player starts playback from the point where you stopped the disc in Step 1.

To play from the beginning of the disc
When the playing time appears on the front panel display before you start playing, press ■ to reset the playing time, then press ▷.

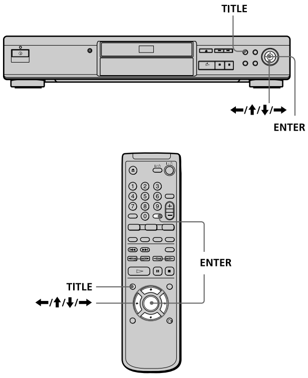
Notes
- Resume Play may not be available on some DVDs.
- Resume Play is not available in Shuffle or Program Play mode.
- Depending on where you stopped the disc, the player may resume playback from a different point.
- The point where you stopped playing is cleared when:
  - you open or close the disc tray
  - you turn the power off by pressing ⏻ on the player
  - you change the play mode
  - you start playback after selecting a title, chapter or track
  - you change the settings in the setup display

Using the DVD's Menu DVD

Some DVDs have a title menu or a DVD menu that is provided with DVDs only.

Using the title menu

A DVD is divided into long sections of a picture or a music feature called "titles." When you play a DVD which contains several titles, you can select the title you want using the title menu.



1 **Press TITLE.**
The title menu appears on the TV screen. The contents of the menu vary from disc to disc.

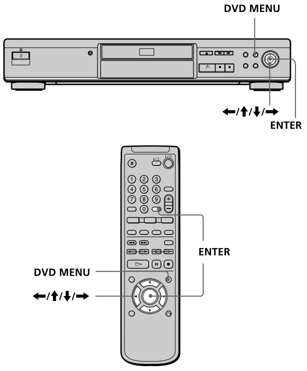
2 **Press ←/↑/↓/→ to select the title you want to play.**
Depending on the disc, you can use the number buttons to select the title.

3 **Press ENTER.**
The player starts playing the selected title.

Notes
- On some DVDs, you may not be able to select the title.
- On some DVDs, a "title menu" may simply be called a "menu" or "title" in the instructions supplied with the disc. "Press ENTER." may also be expressed as "Press SELECT."

Using the DVD menu

Some DVDs allow you to select the disc contents using a menu. When you play these DVDs, you can select the language for the subtitles, the language for the sound, etc., using the DVD menu.



1 **Press DVD MENU.**
The DVD menu appears on the TV screen. The contents of the menu vary from disc to disc.

2 **Press ←/↑/↓/→ to select the item you want to change.**
Depending on the disc, you can use the number buttons to select the item.

3 **To change other items, repeat Step 2.**

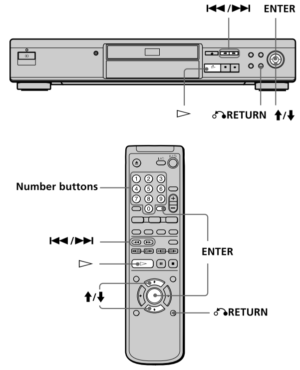
4 **Press ENTER.**

If you want to select the language for the DVD menu
Change the setting using "DVD MENU" in "LANGUAGE SETUP" in the setup display. For details, see page 46.

Note
Depending on the DVD, a "DVD menu" may simply be called a "menu" in the instructions supplied with the disc.

Playing VIDEO CDs with PBC Functions (PBC Playback) VIDEO CD

When playing VIDEO CDs with PBC (Play Back Control) functions (Ver. 2.0 discs), you can enjoy simple interactive operations, search functions, and other such operations.
PBC Playback allows you to play VIDEO CDs interactively by following the menu on the TV screen.
On this player, you can use the number buttons, ENTER, |◀◀, ▶▶|, ↑/↓ and ↶RETURN during PBC Playback.



1 **Start playing a VIDEO CD with PBC functions by following Steps 1 to 4 in "Playing Discs" on page 16.**

2 **Select the item number you want.**
Press ↑/↓ to select the item number.
You can also select the item number with the number buttons on the remote.

3 **Press ENTER.**

4 **Follow the instructions in the menu for interactive operations.**
Refer to the instructions supplied with the disc, as the operating procedure may differ according to the VIDEO CD.

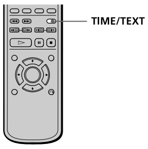
To go back to the menu
Press ↶RETURN, |◀◀, or ▶▶|.

To cancel PBC playback of a VIDEO CD with PBC functions and play the disc in continuous play mode
There are two ways.
- Before you start playing, select the track you want using |◀◀ or ▶▶|, then press ENTER or ▷.
- Before you start playing, select the track number using the number buttons on the remote, then press ENTER or ▷.
  "Play without PBC." appears on the TV screen and the player starts continuous play. You cannot play still pictures such as a menu.
  To return to PBC playback, press ■ twice then press ▷.

Note
Depending on the VIDEO CD, "Press ENTER" in Step 3 may be expressed as "Press SELECT" in the instructions supplied with the disc.

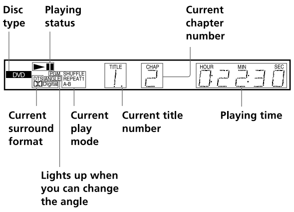
Using the Front Panel Display DVD VIDEO CD CD

You can check information about the disc, such as the total number of titles or tracks or remaining time, using the front panel display.

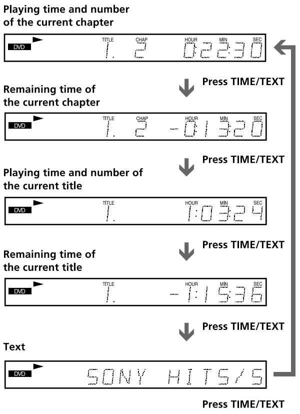


When playing back a DVD DVD

Displaying information while playing the disc



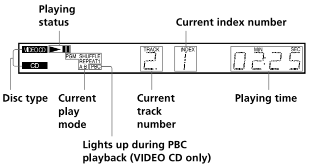
Checking the remaining time
Press TIME/TEXT.
Each time you press TIME/TEXT while playing the disc, the display changes as shown in the following chart.



Notes
- On some DVDs, the chapter number or time may not appear or you may not be able to change the front panel display.
- While you are doing Shuffle Play or Program Play, the playing time of the title and the remaining time of the title are not displayed.

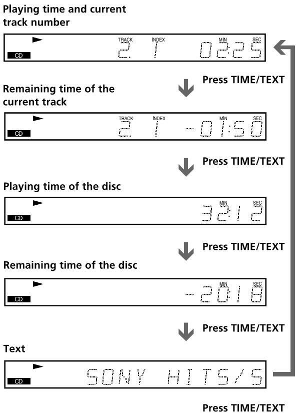
When playing back a CD/VIDEO CD VIDEO CD CD

Displaying information while playing a disc



When playing VIDEO CDs with PBC functions
The current scene number is displayed instead of the current track number and the current index number. In this case, the front panel display does not change when you press TIME/TEXT. If TEXT is recorded on the disc, the front panel display changes to the Text display when you press TIME/TEXT (see page 29).

Checking the remaining time
Press TIME/TEXT.
Each time you press TIME/TEXT while playing a disc, the display changes as shown in the following chart.



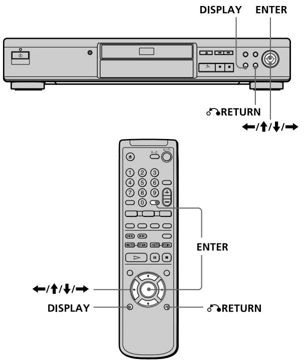
Note
While you are doing Shuffle Play, or Program Play, the playing time of the disc and the remaining time of the disc are not displayed.

Using Various Functions with the Control Menu

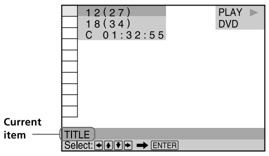
This chapter describes how to play discs in various modes and how to use the convenient features of the on-screen menu (Control Menu).

Using the Control Menu Display DVD VIDEO CD CD

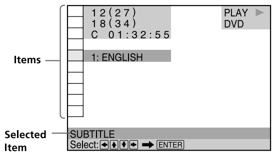
Using the Control Menu display, you can select the starting point, play scenes in any order you like, change the viewing angles, make Digital Cinema Sound settings, and other such operations.
The possible operations are different depending on the kind of disc.
For details on each Control Menu display item, see pages 27 to 42.



1 **Press DISPLAY to show the Control Menu display on the TV screen.**

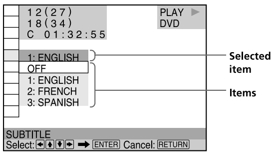


2 **Select the item you want using ↑/↓.**

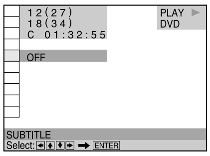


3 **Press ENTER.**

4 **Select the item you want using ↑/↓.**



5 **Press ENTER.**



To cancel while making a selection
Press RETURN.

To display other items
Each time you press DISPLAY, the Control Menu display changes as follows:

→Control Menu display 1
↓
Control Menu display 2
(The items except the first three items from the top are changed to other items.)
↓
ADVANCED display (see page 35)
↓
Control Menu display off

The Control Menu display items are different depending on the disc.

You can select some items directly
Some items can be selected by pressing the corresponding button on the remote. In this case, only the item you selected is displayed. For instructions on using the remote, see the pages of each relevant item.

Note
Some Control Menu display items require operations other than selecting the setting. For details on these items, see the relevant pages.

Control Menu Item List

TITLE (DVD only) (page 27)/
SCENE (VIDEO CD during PBC playback only) (page 27)/
TRACK (VIDEO CD only) (page 27)
CHAPTER (DVD only) (page 27)/
INDEX (VIDEO CD only) (page 27)
TRACK (CD only) (page 27)
INDEX (CD only) (page 27)
You can search for a point on the DVD by selecting the title, chapter, track, index or scene.

TIME/TEXT (pages 28, 29)
You can check the playing time and remaining time of the current title, chapter or track and the total playing time or remaining time of the disc.
You can also search by inputting the time code.
You can check the DVD TEXT or CD TEXT of the disc on the TV screen and the front panel display.

AUDIO (page 30)
If the DVD is recorded with multilingual tracks, you can select the language you want while playing the DVD.
If the DVD is recorded in multiple audio formats (PCM, Dolby Digital or DTS), you can select the audio format you want while playing the DVD.
With CDs or VIDEO CDs, you can select the sound from the right or left channel and listen to the sound of the selected channel through both the right and left speakers.

SUBTITLE (DVD only) (page 32)
With DVDs on which multilingual subtitles are recorded, you can change the subtitle language whenever you want while playing the DVD, and turn it on or off whenever you want.

ANGLE (DVD only) (page 32)
With DVDs on which various angles (multi-angles) for a scene are recorded, you can change the angles.

VES (DVD only) (page 33)
Select a mode to enjoy multichannel surround sound such as Dolby Digital.
Even if you connect only TV or front speakers, Virtual Enhanced Surround (VES) lets you enjoy 3D sound by using 3D sound imaging to create virtual rear speakers from the sound of the front speakers (L, R) without using actual rear speakers.

ADVANCED (DVD only) (page 35)
You can check play information about the bit rate or the position where the disc is being played (layer).

CUSTOM PARENTAL CONTROL (page 36)
Using a registered password, you can set playback restrictions for a desired disc.
The same password is used for both Parental Control (page 48) and Custom Parental Control.

SETUP (page 43)
Using the setup display, you can do the initial setup, adjust the picture and sound and the various outputs.
You can also set a language for the subtitles and the setup display, limit playback by children, and so on. For details about the setup display, see page 45.

PROGRAM (page 37)
You can play the contents of the disc in the order you want by arranging the order of the titles, chapters or tracks on the disc to create your own program.

SHUFFLE (page 39)
You can have the player "shuffle" titles, chapters or tracks and play them in a random order. Subsequent "shuffling" may produce a different playing order.

REPEAT (page 40)
You can play all the titles/tracks on a disc or a single title/chapter/track repeatedly.

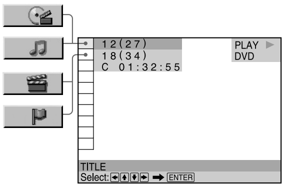
A-B REPEAT (page 41)
You can play a specific portion of a title, chapter, or track repeatedly.

Searching for a Title/Chapter/Track/Index/Scene

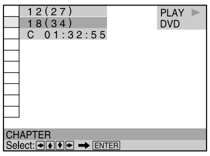
DVD VIDEO CD CD

You can search the disc by title, chapter, track, index or scene.

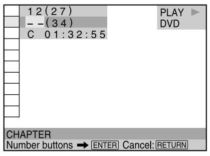
Select "TITLE," "CHAPTER," "TRACK," "INDEX" or "SCENE" after pressing DISPLAY.
When you play back a DVD, "TITLE" and "CHAPTER" are displayed.
When you play back a VIDEO CD/CD, "TRACK" and "INDEX" are displayed. When you play back a VIDEO CD with PBC functions, "SCENE" is displayed.



1 **Select "TITLE," "CHAPTER," "TRACK," "INDEX" or "SCENE" using ↑/↓.**
"✻✻(✻✻)" is highlighted. (✻✻ refers to a number)
The number in parentheses indicates the total number of titles, chapters, tracks, indexes or scenes.



2 **Press → or ENTER.**
"✻✻(✻✻)" changes to "– – (✻✻)."



3 **Select the number of the title, chapter, track, index or scene you want to search for using the number buttons, then press ENTER.**
The player starts playback at the selected number.
To cancel the number, press CLEAR before pressing ENTER.

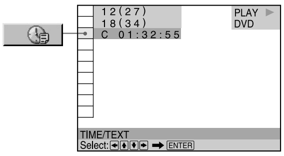
To cancel while making a selection
Press RETURN.

Notes
- The title, chapter or track number displayed is the same number recorded on the disc.
- The index numbers are not displayed during PBC playback of VIDEO CDs.

Checking the Playing Time and Remaining Time DVD VIDEO CD CD

You can check the playing time and remaining time of the current title, chapter or track and the total playing time or remaining time of the disc.

Press DISPLAY. Then press TIME/TEXT on the remote to change the time information.
You can also check the DVD TEXT or CD TEXT. See page 29.



When playing a DVD
■ TIME/TEXT
- C ✻✻:✻✻:✻✻ : Playing time of the current chapter
- C –✻✻:✻✻:✻✻ : Remaining time of the current chapter
- T ✻✻:✻✻:✻✻ : Playing time of the current title
- T –✻✻:✻✻:✻✻ : Remaining time of the current title

When playing a VIDEO CD (during PBC playback)
■ TIME/TEXT
- ✻✻:✻✻ : Playing time of the current scene

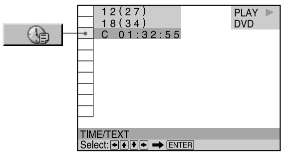
When playing a VIDEO CD (in continuous play) or CD
■ TIME/TEXT
- T ✻✻:✻✻ : Playing time of the current track
- T –✻✻:✻✻ : Remaining time of the current track
- D ✻✻:✻✻ : Playing time of the current disc
- D –✻✻:✻✻ : Remaining time of the current disc

You can select "TIME/TEXT" directly
Press TIME/TEXT on the remote. Each time you press the button, the time information changes.

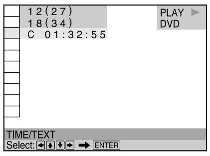
Selecting a Starting Point Using the Time Code DVD

You can search for a starting point by inputting the time code.

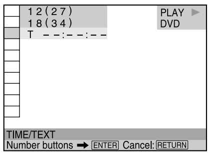
Select "TIME/TEXT" after pressing DISPLAY.
The time code corresponds to the approximate actual playing time. For example, to search for a scene 2 hours 10 minutes 20 seconds past the beginning, input 2:10:20.



1 Select "C ✻✻:✻✻:✻✻" (playing time of the current chapter) when playing a DVD.



2 Press ➡ or ENTER.
Time code changes to "T – – : – – : – –."



3 Input the time code using the number buttons, then press ENTER.
The player starts playback at the selected time code.
To cancel the number, press CLEAR before pressing ENTER.

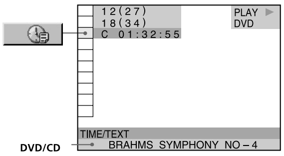
To cancel while making a selection
Press RETURN.

Note
When you input the time code, input the playing time of the title, not the chapter or track time.

Viewing the Disc Information DVD VIDEO CD CD

You can check the DVD TEXT or CD TEXT of the disc on the TV screen and the front panel display.
DVD TEXT and CD TEXT are information recorded on the disc which you cannot change.

Press DISPLAY. Then press TIME/TEXT on the remote until DVD/CD TEXT is displayed.
The information is displayed at the bottom of the display.



DVD/CD TEXT

You can select "TIME/TEXT" directly
Press TIME/TEXT on the remote. To display DVD/CD TEXT, press TIME/TEXT until DVD/CD TEXT is displayed.

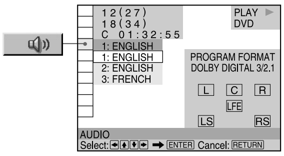
You can view the entire DVD/CD TEXT recorded on the disc
DVD/CD TEXT is scrolled on the front panel display.

Notes
- DVD TEXT is displayed only in English.
- "NO TEXT" appears when the DVD/CD TEXT is not recorded on the disc.
- This player can only display the first level of DVD/CD TEXT information.

Changing the Sound DVD VIDEO CD CD

If the DVD is recorded with multilingual tracks, you can select the language you want while playing the DVD.
If the DVD is recorded in multiple audio formats (PCM, Dolby Digital or DTS), you can select the audio format you want while playing the DVD.
With multiplex CDs or VIDEO CDs, you can select the sound from the right or left channel and listen to the sound of the selected channel through both the right and left speakers. In this case, the sound loses its stereo effect. For example, with a disc containing a song, the right channel may output the vocals and the left channel may output the instrumental. If you only want to hear the instrumental, you can select the left channel and hear it from both speakers.

Select "AUDIO" after pressing DISPLAY.



■ AUDIO
When playing a DVD
Select the language. The languages you can select are different depending on the DVD. When 4 digits are displayed, they represent the language code. Select the language code from the list on page 62.
When the same language is displayed two or more times, the DVD is recorded in multiple audio formats. The current audio format is shown on the "PROGRAM FORMAT" display.

When playing a VIDEO CD or a CD
The default setting is underlined.

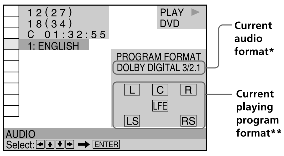
- <u>STEREO</u> : The standard stereo sound
- 1/L : The sound of the left channel (monaural)
- 2/R : The sound of the right channel (monaural)

You can select "AUDIO" directly
Press AUDIO on the remote. Each time you press the button, the item changes.

Notes
- Depending on the DVD, you may not be able to change the languages even if multilingual tracks are recorded on the DVD.
- While playing the CD/VIDEO CD, standard stereo playback will be resumed when:
  – you open or close the disc tray
  – the player enters standby mode by pressing I/⏻ on the remote
  – you turn the power off by pressing ⏻ on the player
- While playing the DVD, the sound may be changed when:
  – you open or close the disc tray
  – you change the title
- If "DTS" is set to "OFF" in "AUDIO SETUP," the DTS track selection option will not appear on the screen even if the disc contains DTS tracks.

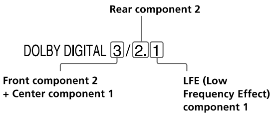
Displaying the audio information of the disc DVD

When you select "AUDIO," the channels being played are displayed on the screen.
In Dolby Digital format, multiple signals ranging from monaural to 5.1 channel signals can be recorded on a DVD. Depending on the DVD, the number of the recorded channels may be different.



* "PCM," "DTS" or "DOLBY DIGITAL" is displayed. In case of "DOLBY DIGITAL," the channels in the playing track are displayed by numbers as follows:

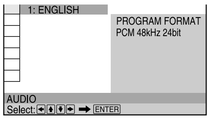
For Dolby Digital 5.1 ch:



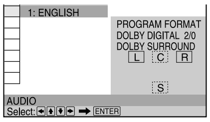
** The letters in the program format display mean the following:

L:	Front (left)
R:	Front (right)
C:	Center (monaural)
LS:	Rear (left)
RS:	Rear (right)
S:	Rear (monaural) – the rear component of the Dolby Surround processed stereo signal and the Dolby Digital signal.
LFE:	– LFE (Low Frequency Effect)

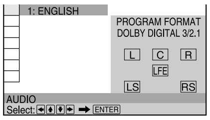
The display examples are as follows:
- PCM (stereo)



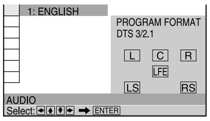
- Dolby Surround



- Dolby Digital 5.1ch
  "LFE" appears only when a disc contains an LFE signal component. "LFE" remains on the "PROGRAM FORMAT" display even if the LFE signal component is not being output.



- DTS
  "LFE" is always enclosed in a solid line regardless of the LFE signal component being output.

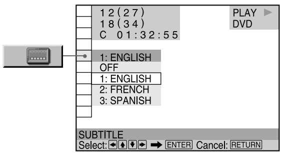


Note
When the signal does not contain rear signal components such as LS, RS or S, the Virtual Enhanced Surround (VES) effect cannot be heard (page 33).

Displaying the Subtitles DVD

With DVDs on which subtitles are recorded, you can turn the subtitles on and off whenever you want while playing the DVD.
With DVDs on which multilingual subtitles are recorded, you can change the subtitle language whenever you want while playing the DVD, and turn it on or off whenever you want. For example, you can select the language you want to practice and turn the subtitles on for better understanding.

Select "SUBTITLE" after pressing DISPLAY.



■ **SUBTITLE**
Select the language. The languages you can select are different depending on the DVD. When 4 digits are displayed, they indicate the language code. Select the language code from the list on page 62.

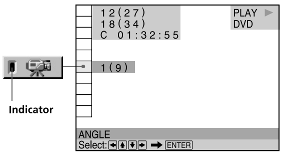
You can select "SUBTITLE" directly
Press SUBTITLE on the remote. Each time you press the button, the item changes.

Notes
- When playing a DVD on which no subtitles are recorded, no subtitles appear.
- Depending on the DVD, you may not be able to turn the subtitles on even if they are recorded on the DVD.
- Depending on the DVD, you may not be able to turn the subtitles off.
- The type and number of languages for subtitles vary from disc to disc.
- Depending on the DVD, you may not be able to change the subtitles even if multilingual subtitles are recorded on it.
- While playing the DVD, the subtitle may change when:
  – you open or close the disc tray
  – you change the title

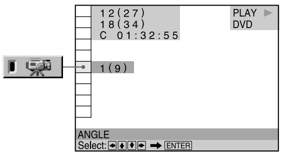
Changing the Angles DVD

With DVDs on which various angles (multi-angles) for a scene are recorded, you can change the angles. For example, while playing a scene of a train in motion, you can display the view from either the front of the train, the left window of the train or from the right window without having the train's movement interrupted.

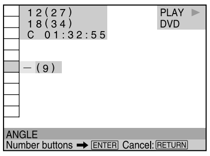
Select "ANGLE" after pressing DISPLAY. When the angles can be changed, the "ANGLE" indicator lights up in green.



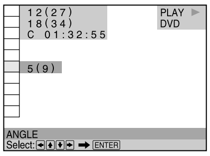
1 **Select "ANGLE."**



2 **Press ➡.**
The number of the angle changes to "–." The number in parentheses indicates the total number of angles.



3 **Select the angle number using the number buttons or ↑/↓, then press ENTER.**
The angle is changed to the selected angle.



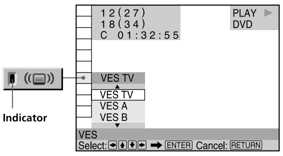
You can select "ANGLE" directly
Press ANGLE on the remote. Each time you press the button, the angle changes.

Notes
- The number of angles varies from disc to disc or from scene to scene. The number of angles that can be changed on a scene is equal to the number of angles recorded for that scene.
- Depending on the DVD, you may not be able to change the angles even if multi-angles are recorded on the DVD.

Digital Cinema Sound Settings DVD

Select a mode to enjoy multichannel surround sound such as Dolby Digital.
Even if you connect only a stereo TV or front speakers, Virtual Enhanced Surround (VES) lets you enjoy 3D sound by using 3D sound imaging to create virtual rear speakers from the sound of the front speakers (L: left, R: right) without using actual rear speakers.
The surround sound signals are output from the AUDIO OUT connectors. These signals are not output from the DIGITAL OUT OPTICAL or COAXIAL connector.
When you select a surround mode, the player does not output the Dolby Digital signals from the DIGITAL OUT OPTICAL or COAXIAL connector if you set "DOLBY DIGITAL" in "AUDIO SETUP" to "D-PCM."

Select "VES" after pressing DISPLAY. When you select any item except "OFF," the "VES" indicator lights up in green.

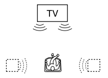


■ **VES**
Select the desired item. For details on each item, see "Effects of each item."
The default setting is underlined.
- <u>OFF</u>
- VES TV
- VES A
- VES B
- VIRTUAL SEMI MULTI DIMENSION

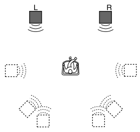
Effects of each item

OFF
Outputs 2-channel signals for stereo sound. 5-channel signals for Dolby Digital sound of a DVD are mixed down to 2-channels.

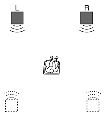
VES (Virtual Enhanced Surround) TV
Uses 3D sound imaging to create virtual rear speakers from the sound of the front speakers (L, R) without using actual rear speakers. This mode is effective when the distance between the front L and R speakers is short, such as built-in speakers on a stereo TV.



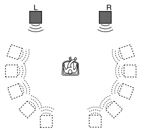
VES (Virtual Enhanced Surround) A
Uses 3D sound imaging to create virtual rear speakers from the sound of the front speakers (L, R) without using actual rear speakers. The virtual speakers are reproduced as shown in the illustration below.



VES (Virtual Enhanced Surround) B
Uses 3D sound imaging to create virtual rear speakers from the sound of the front speakers (L, R) without using actual rear speakers. The virtual speakers are reproduced as shown in the illustration below.



VIRTUAL SEMI MULTI DIMENSION
Uses 3D sound imaging to create virtual rear speakers from the sound of the front speakers (L, R) without using actual rear speakers. This mode creates 5 sets of virtual speakers surrounding the listener at a 30° angle of elevation.



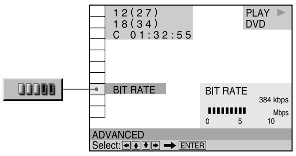
You can select "VES" directly
Press VES on the player. Each time you press the button, the item changes.

Notes
- When you select an item, the sound cuts off for a moment.
- When the playing signal does not contain the surround component, the effects may be difficult to hear even if you select "VES TV," "VES A," "VES B" or "VIRTUAL SEMI MULTI DIMENSION."
- Set the front speakers to form an equilateral triangle with the listening position at the top, or the effects may be difficult to hear even if you select "VES A," "VES B" or "VIRTUAL SEMI MULTI DIMENSION."
- When you select "VES TV," "VES A," "VES B" or "VIRTUAL SEMI MULTI DIMENSION," set the surround settings of the connected units, such as the amplifier, to OFF.

Checking the Play Information DVD

You can check information such as the bit rate or the disc layer that is being played.
While playing a disc, the approximate bit rate of the playback picture is always displayed as Mbps (Mega bit per second) and the audio as kbps (kilo bit per second).

Select "ADVANCED" after pressing DISPLAY.



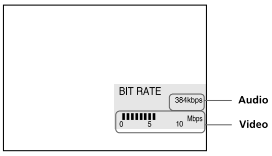
■ **ADVANCED**
The default setting is underlined.

When playing a DVD
- <u>BIT RATE</u>: displays the bit rate.
- LAYER: displays the layer and the pick-up point.
- OFF: turns off ADVANCED display.

Displays of each item

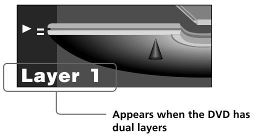
By pressing DISPLAY repeatedly, you can display either "BIT RATE" or "LAYER," whichever was selected in "ADVANCED."

BIT RATE



Bit rate refers to the amount of video/audio data per second in a disc. The higher the bit rate, the larger the amount of data. When the bit rate level is high, there is a large amount of data. However, this does not always mean that you can get higher quality pictures or sounds.

LAYER

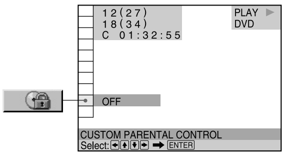


Indicates the approximate point where the disc is playing. If it is a dual-layer DVD, the player indicates which layer is being read ("Layer 0" or "Layer 1").
For details on the layers, see page 60 (DVD).

Locking Discs (Custom Parental Control) DVD VIDEO CD CD

Using a registered password, you can set playback restrictions for the desired disc.
You can set the same Custom Parental Control password for up to 50 discs. When you set the fifty-first disc, the first disc is canceled.
The same password is used for both Parental Control (page 48) and Custom Parental Control.

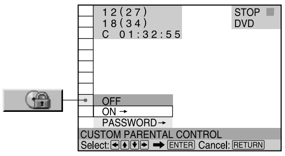
Select "CUSTOM PARENTAL CONTROL" after pressing DISPLAY.



Setting the Custom Parental Control for a disc

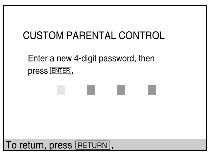
1 Insert the disc you want to lock.
If a disc is playing, press ■ to stop playback.

2 Select "CUSTOM PARENTAL CONTROL" using ↑/↓, then press ENTER.

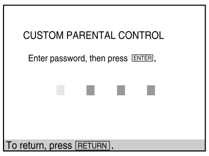


3 Select "ON→" using ↑/↓, then press ENTER.

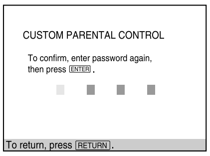
■ If you have not entered a password
The display for entering a password appears.



■ When you have already registered a password
The display for confirming the password appears. Skip Step 4.



4 Enter a 4-digit password using the number buttons, then press ENTER.
The digits change to asterisks (*), and the display for confirming the password appears.



5 Enter the same 4-digit password using the number buttons, then press ENTER.
"Custom parental control is set." appears and then the screen returns to the Control Menu display.

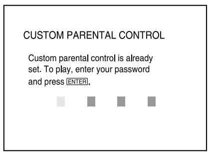
To return to the normal screen
Press ↶RETURN.

To turn off the Custom Parental Control function
1 Select "CUSTOM PARENTAL CONTROL" using ↑/↓, then press ENTER.
2 Select "OFF→" using ↑/↓, then press ENTER.
3 Enter your 4-digit password using the number buttons, then press ENTER.

To change the password
1 Select "CUSTOM PARENTAL CONTROL" using ↑/↓, then press ENTER.
2 Select "PASSWORD→" using ↑/↓, then press ENTER.
3 Enter your 4-digit password using the number buttons, then press ENTER.
The display for changing the password appears.
4 Enter a new 4-digit password using the number buttons, then press ENTER.
5 To confirm your password, re-enter it using the number buttons, then press ENTER.

Playing the disc for which the Custom Parental Control is set

1 Insert the disc.
The CUSTOM PARENTAL CONTROL display appears.



2 Enter your 4-digit password using the number buttons, then press ENTER.
The player starts playback.

If you forget your password
Enter the 6-digit number "199703" whenever the CUSTOM PARENTAL CONTROL display asks you for your password, then press ENTER. The display will ask you to enter a new 4-digit password.

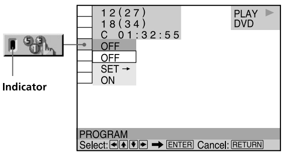
Note
Unless you enter the password, the player cannot play the disc for which the Custom Parental Control is set. When you do not know the password, press ≜ and remove the disc.

Creating Your Own Program (Program Play)

DVD VIDEO CD CD

You can play the contents of the disc in the order you want by arranging the order of the titles, chapters or tracks on the disc and create your own program. One program can be stored in the player and contain up to 99 titles, chapters and tracks.

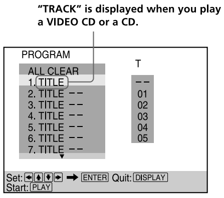
Select "PROGRAM" after pressing DISPLAY. When you select "ON," the "PROGRAM" indicator lights up in green.



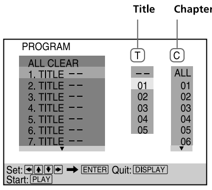
■ PROGRAM
The default setting is underlined.
- OFF: plays normally.
- SET→: allows you to create your own program.
- ON: plays Program Play.

Creating the program

1 Select "SET→" in "PROGRAM."
The programming display appears.

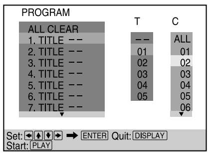


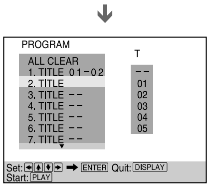
2 Press →.
"01" is highlighted. It is ready to set the first title or track for Program Play.



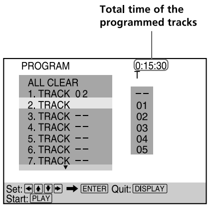
3 Select the title, chapter or track you want to program using ↑/↓, then press ENTER.
For example, select title or track 2.
(You can also use the number buttons and ENTER button to make a selection. In this case, the selected number is displayed on the screen.)

■ When playing a DVD
When both titles and chapters are recorded on the disc, select the title, then the chapter.





■ When playing a VIDEO CD or CD
Select the track you want to program.



4 To program other titles, chapters or tracks, repeat Step 3.
The programmed titles, chapters or tracks are displayed in the selected order.

5 Press ▷ to start Program Play.

To stop Program Play
Press CLEAR on the remote.

To cancel programming
Press PROGRAM on the remote.

To change the program
1 In Step 2, select the program number of the title, chapter or track you want to change using ↑/↓.
2 Follow Step 3 for new programming.

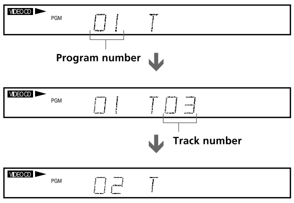
To cancel the programmed order
To cancel all the titles, chapters or tracks in the programmed order, select "ALL CLEAR" in Step 2.
To cancel the selected program, select the program using ↑/↓ in Step 2 then press CLEAR, or select "– –" in Step 3 then press ENTER.

The program remains even after Program Play ends
When you press ▷, you can play the same program again.

You can do Repeat Play or Shuffle Play of the programmed titles, chapters or tracks
During Program Play, press REPEAT or SHUFFLE on the remote. Or set "REPEAT" or "SHUFFLE" to "ON" in the Control Menu display.

You can select "PROGRAM" directly
Press PROGRAM on the remote.

You can select discs, titles, chapters and tracks for the program by looking at the front panel display
You can program by looking at the front panel display instead of using the programming display on the TV screen.
When you select Track 3 in a VIDEO CD for Program 1, the front panel display will appear as follows:



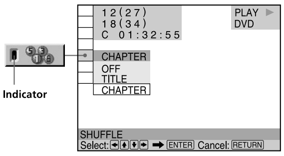
Notes
- The number of titles, chapters or tracks displayed are the same number of titles, chapters or tracks recorded on a disc.
- The program is canceled when:
  - you open or close the disc tray
  - the player enters standby mode by pressing I/⏻ on the remote
  - you turn the power off by pressing ⏻ on the player
- Depending on the DVD, you may not be able to perform Program Play.
- If you are using the PBC playback function, you must first stop the disc before you can set a program.

Playing in Random Order (Shuffle Play)

DVD VIDEO CD CD

You can have the player "shuffle" titles, chapters or tracks and play them in a random order. Subsequent "shuffling" may produce a different playing order.

Select "SHUFFLE" after pressing DISPLAY. When you select a shuffle mode other than "OFF," the "SHUFFLE" indicator lights up in green.



■ SHUFFLE
Selects the Shuffle Play setting.
The default settings are underlined.

When playing a DVD and when Program Play is set to OFF
- OFF: does not play a disc in random order.
- TITLE: has the player "shuffle" titles and play them in random order.
- CHAPTER: has the player "shuffle" chapters and play them in a random order.

When playing a VIDEO CD or CD (when Program Play is set to OFF)
- OFF: does not play a disc in random order.
- TRACK: has the player "shuffle" tracks and play them in a random order.

When playing a VIDEO CD, CD or DVD (when Program Play is set to ON)
- OFF: does not play a disc in random order.
- ON: has the player "shuffle" titles or tracks selected in Program Play and play them in a random order.

To stop Shuffle Play
Press CLEAR on the remote.

💡 You can set Shuffle Play while the disc is stopped
After selecting the "SHUFFLE" option, press ▷.
The player starts Shuffle Play.

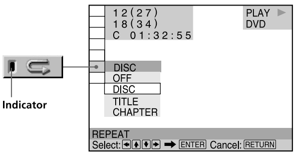
💡 You can select "SHUFFLE" directly
Press SHUFFLE on the remote. Each time you press the button, the item changes.

Notes
- Shuffle Play is canceled when:
  – you open or close the disc tray
  – the player enters standby mode by pressing I/⏻ on the remote
  – you turn the power off by pressing ⏻ on the player
- Depending on the DVD, you may not be able to perform Shuffle Play.
- Up to 200 chapters in a disc can be played in random order when "CHAPTER" is selected.

Playing Repeatedly (Repeat Play) DVD VIDEO CD CD

You can play all of the titles or tracks on a disc or a single title, chapter or track repeatedly.
In Shuffle or Program Play mode, the player repeats the titles or tracks in the shuffled or programmed order.
You cannot perform Repeat Play during PBC playback of VIDEO CDs (page 21).

Select "REPEAT" after pressing DISPLAY. When you select a repeat mode other than "OFF," the "REPEAT" indicator lights up in green.



■ **REPEAT**
Selects the Repeat Play setting.
The default settings are underlined.

When playing a DVD and when Program Play and Shuffle Play are set to OFF
- OFF: does not play repeatedly.
- DISC: repeats all of the titles.
- TITLE: repeats the current title on a disc.
- CHAPTER: repeats the current chapter.

When playing a VIDEO CD/CD and when Program Play and Shuffle Play are set to OFF
- OFF: does not play repeatedly.
- DISC: repeats all of the tracks on a disc.
- TRACK: repeats the current track.

When Program Play or Shuffle Play is set to ON
- OFF: does not play repeatedly.
- ON: repeats Program Play or Shuffle Play.

To stop Repeat Play
Press CLEAR on the remote.

💡 You can set Repeat Play while the disc is stopped
After selecting the "REPEAT" option, press ▷.
The player starts Repeat Play.

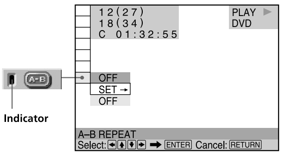
💡 You can select "REPEAT" directly
Press REPEAT on the remote. Each time you press the button, the item changes.

Notes
- Repeat play is canceled when:
  – you open or close the disc tray
  – the player enters standby mode by pressing I/⏻ on the remote
  – you turn the power off by pressing ⏻ on the player
- Depending on the DVD, you may not be able to perform Repeat Play.

Repeating a Specific Portion (A-B Repeat) DVD VIDEO CD CD

You can play a specific portion of a title, chapter or track repeatedly. This function is useful when you want to do such things as memorize lyrics.
During PBC Playback of VIDEO CDs (page 21), this function is available only while playing moving pictures.

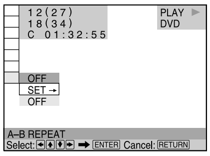
Select "A-B REPEAT" after pressing DISPLAY. During A-B Repeat Play, the "A-B REPEAT" indicator lights up in green.

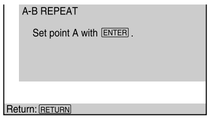


■ **A-B REPEAT**
The default setting is underlined.
- SET➡: sets the A and B points.
- OFF: does not play a specific portion of a title/chapter/track repeatedly.

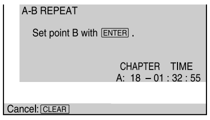
Setting a portion for A-B repeat

1 **Select "SET➡" in "A-B REPEAT."**
The A-B REPEAT setting display appears.

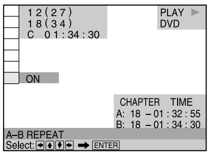




2 **During playback, when you find the starting point (point A) of the portion to be played repeatedly, press ENTER.**
The starting point (point A) is set.



3 **When you reach the ending point (point B), press ENTER again.**
The set points are displayed and the player starts repeating this specific portion.
"A-B" appears on the front panel display during A-B repeat play.



To stop A-B Repeat Play
Press CLEAR on the remote.

💡 You can select "A-B REPEAT" directly
Press A-B on the remote.

Notes
- You can set A-B Repeat for only one specific portion.
- A-B Repeat is canceled when:
  – you open or close the disc tray
  – the player enters standby mode by pressing I/⏻ on the remote
  – you turn the power off by pressing ⏻ on the player
- When you set A-B Repeat, the settings for Shuffle Play and Program Play are canceled.
- You may not be able to set A-B Repeat for some DVD or VIDEO CD scenes.

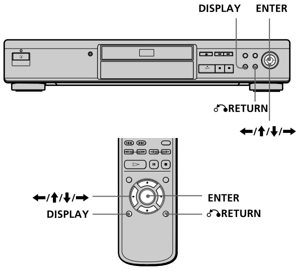
Settings and Adjustments

This chapter describes how to set and adjust the player using the on-screen setup menu. Most settings and adjustments are required to be set when you first use the player.
This chapter also describes how to set the remote for controlling the TV or the AV receiver (amplifier).

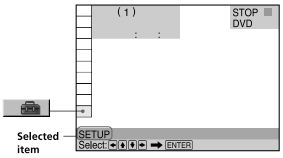
Using the Setup Display DVD VIDEO CD CD

Using the setup display, you can do the initial setup, adjust the picture and sound and set the various outputs. You can also set a language for the subtitles and the setup display, limit playback by children, and so on.
For details on each setup display item, see pages 46 to 53.

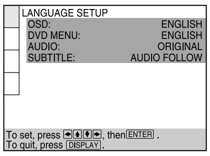
Note
You can display the setup display only when the player is in stop mode.



1 **Press DISPLAY and select "SETUP" using ↑/↓.**



2 **Press ENTER.**
The setup display appears.



3 Select the main item you want using ↑/↓.

Main item

```
LANGUAGE SETUP
OSD:                 ENGLISH
DVD MENU:            ENGLISH
AUDIO:               ORIGINAL
SUBTITLE:            AUDIO FOLLOW

To set, press ←↑↓→, then ENTER.
To quit, press DISPLAY.
```

4 Press ENTER.
The selected main item is highlighted.

```
SCREEN SETUP
TV TYPE:             4:3 LETTER BOX
SCREEN SAVER:        ON
BACKGROUND:          JACKET PICTURE

To set, press ←↑↓→, then ENTER.
To quit, press DISPLAY.
```

5 Select the item you want using ↑/↓.

```
SCREEN SETUP
TV TYPE:             4:3 LETTER BOX
SCREEN SAVER:        ON
BACKGROUND:          JACKET PICTURE

To set, press ←↑↓→, then ENTER.
To quit, press DISPLAY.
```

6 Press ENTER.

```
SCREEN SETUP
TV TYPE:             4:3 LETTER BOX
SCREEN SAVER:        4:3 LETTER BOX
BACKGROUND:          4:3 PAN SCAN
                     16:9/4:3 WIDE MODE

To set, press ←↑↓→, then ENTER.
To quit, press DISPLAY.
```

7 Select the setting you want using ←/↑/↓/→.

```
SCREEN SETUP
TV TYPE:             4:3 LETTER BOX
SCREEN SAVER:        4:3 LETTER BOX
BACKGROUND:          4:3 PAN SCAN
                     16:9/4:3 WIDE MODE

To set, press ←↑↓→, then ENTER.
To quit, press DISPLAY.
```

8 Press ENTER.

```
SCREEN SETUP
TV TYPE:             16:9/4:3 WIDE MODE
SCREEN SAVER:        ON
BACKGROUND:          JACKET PICTURE

To set, press ←↑↓→, then ENTER.
To quit, press DISPLAY.
```

9 Press DISPLAY.
The setup display disappears.

10 Press DISPLAY repeatedly to turn off the on-screen menu.

To return to the previous screen
Press ↶RETURN.

To quit while making a selection
Press DISPLAY.

Note
Some setup display items require operations other than selecting the setting. For details on these items, see the relevant pages.

Setup Display Item List

The default settings are underlined.

LANGUAGE SETUP (page 46)
- OSD: <u>ENGLISH</u>, FRENCH, SPANISH, PORTUGUESE
- DVD MENU: <u>ENGLISH</u>, FRENCH, SPANISH, PORTUGUESE, GERMAN, ITALIAN, DUTCH, CHINESE, JAPANESE, DANISH, SWEDISH, FINNISH, NORWEGIAN, RUSSIAN, OTHERS ➡
- AUDIO: <u>ORIGINAL</u> (same as DVD MENU)
- SUBTITLE: <u>AUDIO FOLLOW</u> (same as DVD MENU)

SCREEN SETUP (page 47)
- TV TYPE: <u>4:3 LETTER BOX</u>, 4:3 PAN SCAN, 16:9/4:3 WIDE MODE
- SCREEN SAVER: <u>ON</u>, OFF
- BACKGROUND: <u>JACKET PICTURE</u>, GRAPHICS, BLUE, BLACK

CUSTOM SETUP (page 48)
- AUTO PLAY: <u>OFF</u>, TIMER, DEMO1, DEMO2
- DIMMER: <u>BRIGHT</u>, DARK, OFF
- PAUSE MODE: <u>AUTO</u>, FRAME
- PARENTAL CONTROL ➡
- TRACK SELECTION: <u>OFF</u>, AUTO

AUDIO SETUP (page 51)
- AUDIO ATT: <u>OFF</u>, ON
- AUDIO DRC: <u>STANDARD</u>, TV MODE, WIDE RANGE
- DOWNMIX: <u>DOLBY SURROUND</u>, NORMAL
- DIGITAL OUT: <u>ON</u>, OFF
  - DOLBY DIGITAL: <u>D-PCM</u>, DOLBY DIGITAL
  - DTS: <u>OFF</u>, ON

Setting the Display Language or Sound Track (LANGUAGE SETUP) DVD VIDEO CD CD

"LANGUAGE SETUP" allows you to set various languages for the on-screen display or sound track.
The default settings are underlined.

Select "LANGUAGE SETUP" in the setup display.

```
LANGUAGE SETUP
OSD:                 ENGLISH
DVD MENU:            ENGLISH
AUDIO:               ORIGINAL
SUBTITLE:            AUDIO FOLLOW

To set, press ←↑↓→, then ENTER.
To quit, press DISPLAY.
```

Notes
- When you select a language that is not recorded on the DVD, one of the recorded languages is automatically selected for the "DVD MENU," "AUDIO" and "SUBTITLE" settings.
- Depending on the DVD, the player may not start playing with the selected language even when you select a language in "DVD MENU," "AUDIO" or "SUBTITLE."

■ OSD (On-Screen Display)
Selects the language for the on-screen display.
- <u>ENGLISH</u>
- FRENCH
- SPANISH
- PORTUGUESE

■ DVD MENU
Selects the language for the DVD menu.
- <u>ENGLISH</u>
- FRENCH
- SPANISH
- PORTUGUESE
- GERMAN
- ITALIAN
- DUTCH
- CHINESE
- JAPANESE
- DANISH
- SWEDISH
- FINNISH
- NORWEGIAN
- RUSSIAN
- OTHERS➡
  When you select "OTHERS➡," select and enter the language code from the list using the number buttons (page 62).
  After you have made a selection, the language code (4 digits) is displayed.

■ AUDIO
Selects the language for the sound track.
- <u>ORIGINAL</u>: the language given priority in the disc
- ENGLISH
- FRENCH
- SPANISH
- PORTUGUESE
- GERMAN
- ITALIAN
- DUTCH
- CHINESE
- JAPANESE
- DANISH
- SWEDISH
- FINNISH
- NORWEGIAN
- RUSSIAN
- OTHERS➡
  When you select "OTHERS➡," select and enter the language code from the list using the number buttons (page 62).
  After you have made a selection, the language code (4 digits) is displayed.

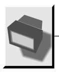
■ SUBTITLE
Selects the language for the subtitles.
- <u>AUDIO FOLLOW*</u>
- ENGLISH
- FRENCH
- SPANISH
- PORTUGUESE
- GERMAN
- ITALIAN
- DUTCH
- CHINESE
- JAPANESE
- DANISH
- SWEDISH
- FINNISH
- NORWEGIAN
- RUSSIAN
- OTHERS➡
  When you select "OTHERS➡," select and enter the language code from the list using the number buttons (page 62).
  After you have made a selection, the language code (4 digits) is displayed.

* When you select "AUDIO FOLLOW," the language for the subtitles changes according to the language for the setting you selected in "AUDIO."

Settings for the Display (SCREEN SETUP) DVD VIDEO CD CD

"SCREEN SETUP" allows you to set the display according to the playback conditions.
The default settings are underlined.

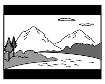
Select "SCREEN SETUP" in the setup display.



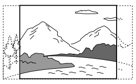
```
SCREEN SETUP
TV TYPE:             4:3 LETTER BOX
SCREEN SAVER:        ON
BACKGROUND:          JACKET PICTURE

To set, press ←↑↓→, then ENTER.
To quit, press DISPLAY.
```

■TV TYPE
Selects the aspect ratio of the TV to be connected.
- <u>4:3 LETTER BOX</u>: select this when you connect a normal TV to the player. Displays a wide picture with bands on the upper and lower portions of the screen.
- 4:3 PAN SCAN: select this when you connect a normal TV to the player. Displays the wide picture on the whole screen automatically and cuts off the portions that do not fit.
- 16:9/4:3 WIDE MODE: select this when you connect a wide-screen TV to the player or when you connect a TV with WIDE MODE function to the player (displays a wide picture with bands displayed on the upper and lower portions of the screen).

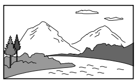
4:3 LETTER BOX



4:3 PAN SCAN



16:9



4:3 WIDE MODE

Note
Depending on the DVD, "4:3 LETTER BOX" may be selected automatically instead of "4:3 PAN SCAN" and vice versa.

■ SCREEN SAVER
Turns on and off the screen saver. If you turn on the screen saver, the screen saver image appears when you leave the player or the remote in pause or stop mode for 15 minutes, or when you play back a CD for more than 15 minutes. The screen saver will help prevent your display device from becoming damaged.
- <u>ON</u>: turns on the screen saver.
- OFF: turns off the screen saver.

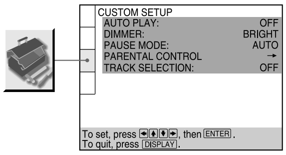
■ BACKGROUND
Selects the background color on picture on the TV screen in stop mode or while playing a CD.
- <u>JACKET PICTURE</u>: The jacket picture appears in the background, but only when the jacket picture is already recorded on the disc.
- GRAPHICS: A preset picture stored in the player appears in the background.
- BLUE: The background color is blue.
- BLACK: The background color is black.

Note
If a disc which does not contain the jacket picture is played while "BACKGROUND" is set to "JACKET PICTURE," the picture stored in the player will automatically appear in the background.

Custom Settings (CUSTOM SETUP) DVD VIDEO CD CD

"CUSTOM SETUP" allows you to set the playback conditions.
The default settings are underlined.

Select "CUSTOM SETUP" in the setup display.



■ **AUTO PLAY**
Selects the Auto Play setting when you connect the AC power cord to the AC outlet.
- OFF: does not use "TIMER," "DEMO1" or "DEMO2" to start playback.
- TIMER: starts playing when the player is turnd on, or at any time you want when connected to a timer (not supplied). Set the timer when the player is in standby mode (the power indicator lights up in red).
- DEMO1: starts playing the first demonstration automatically.
- DEMO2: starts playing the second demonstration automatically.

■ **DIMMER**
Adjusts the lighting of the front panel display.
- BRIGHT: makes the front panel display bright.
- DARK: makes the front panel display dark.
- OFF: turns off the lighting of the front panel display.

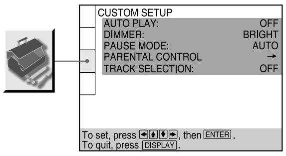
■ **PAUSE MODE (DVD only)**
Selects the picture in pause mode.
- AUTO: A picture, including subjects that move dynamically, is output with no jitter. Normally select this position.
- FRAME: A picture including subjects that do not move dynamically is output with high resolution.

■ **PARENTAL CONTROL➡**
Sets a password and playback limitation level for DVDs with playback limitation for children.
The same password is used for both Parental Control and Custom Parental Control (page 36) .
For details, see "Limiting Playback by Children (Parental Control)."

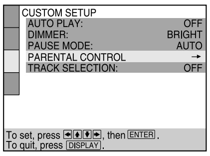
Limiting Playback by Children (Parental Control) DVD

Playback of some DVDs can be limited depending on the age of the users. The "Parental Control" function allows you to set a playback limitation level.

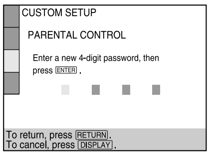
Select "CUSTOM SETUP" in the setup display.



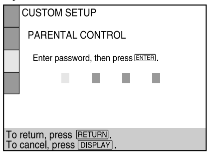
1 Select "PARENTAL CONTROL" using ↑/↓, then press ENTER.



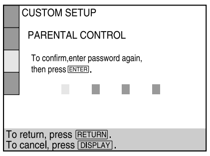
■ **When you have not entered a password**
The display for entering a password appears.



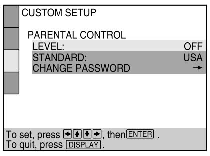
■ **When you have already registered a password**
The display for confirming the password appears. Skip Step 2.



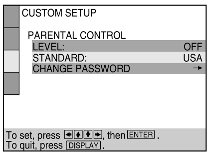
2 Enter a password in 4 digits using the number buttons, then press ENTER.
The digits change to asterisks (✱), and the display for confirming the password appears.



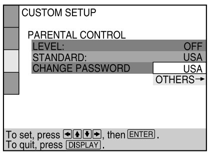
3 To confirm your password, enter it again using the number buttons, then press ENTER.
The display for setting the playback limitation level and changing the password appears.



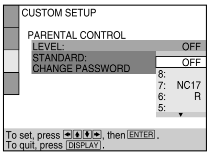
4 Select "STANDARD" using ↑/↓, then press ➡.



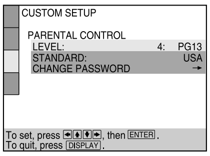
5 Select a geographic area as the playback limitation level standard using ↑/↓, then press ➡.
When you select "OTHERS➡," select and enter the standard code in the table on the next page using the number buttons.



6 Select "LEVEL" using ↑/↓, then press ➡.



7 Select the level you want using ↑/↓, then press ENTER.



The lower the value, the more strict the limitation.

To return to the normal screen
Press DISPLAY.

To turn off the Parental Control function and play the DVD after entering your password
Set "LEVEL" to "OFF" in Step 7, then press ▷.

To change the password
1 After Step 3, select "CHANGE PASSWORD" using ↑/↓, then press ➡ or ENTER.
The display for changing the password appears.
2 Follow Steps 2 and 3 to enter a new password.

Playing a disc which is blocked by the playback limitation level
1 Insert the disc and press ▷.
The PARENTAL CONTROL display appears.
2 Enter your 4-digit password using the number buttons, then press ENTER.
The player starts playback.
When you stop playing the DVD, the level returns to the original level.

If you forget your password
Enter the 6-digit number "199703" whenever the PARENTAL CONTROL display asks you for your password, then press ENTER. The display will ask you to enter a new 4-digit password.

Notes
- When you play DVDs which do not have the Parental Control function, playback cannot be limited on this player.
- If you do not set a password, you cannot change the settings for playback limitation.
- Depending on the DVD, you may be asked to change the parental control level while playing the disc. In this case, enter your password, then change the level.
When you stop playing the DVD, the level returns to the original level.
- The same password is used for both Parental Control and Custom Parental Control (page 36) .

Standard	Code number
Argentina	2044
Australia	2047
Austria	2046
Belgium	2057
Brazil	2070
Canada	2079
Chile	2090
China	2092
Denmark	2115
Finland	2165
France	2174
Germany	2109
Hong Kong	2219
India	2248
Indonesia	2238
Italy	2254
Japan	2276
Korea	2304
Malaysia	2363
Mexico	2362
Netherlands	2376
New Zealand	2390
Norway	2379
Pakistan	2427
Philippines	2424
Portugal	2436
Russia	2489
Singapore	2501
Spain	2149
Sweden	2499
Switzerland	2086
Taiwan	2543
Thailand	2528
United Kingdom	2184

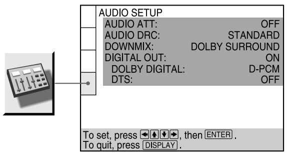
■ **TRACK SELECTION**
Gives the sound track which contains the highest number of channels priority when you play a DVD on which multiple audio formats (PCM, DTS or Dolby Digital format) are recorded.
- OFF : No priority given.
- AUTO : Priority given.

Notes
- When you set this item to "AUTO," the language may change depending on the "AUDIO" settings in "LANGUAGE SETUP." The "TRACK SELECTION" setting has higher priority than the "AUDIO" settings in "LANGUAGE SETUP" (page 46).
- If you set "DTS" in "AUDIO SETUP" to "OFF," the DTS sound track is not played even if you set this item to "AUTO" and the highest-numbered audio channel is recorded in DTS format.
- If PCM, DTS and Dolby Digital sound tracks have the same number of channels, the player selects PCM, DTS and Dolby Digital sound tracks in this order.
- Depending on the DVD, the audio channel with priority may be predetermined. In this case, you cannot give priority to the DTS or Dolby Digital format by selecting "AUTO."

Settings for the Sound (AUDIO SETUP)

"AUDIO SETUP" allows you to set the sound according to the playback conditions.
The default settings are underlined.

Select "AUDIO SETUP" in the setup display.



■ **AUDIO ATT (attenuation)**
If the playback sound is distorted, set this item to "ON." The player reduces the audio output level.
Selects the setting of the output from the AUDIO OUT connectors according to the audio equipment to be connected.
- OFF: turns off the audio attenuation. Normally select this position.
- ON: reduces the audio output level so that no sound distortion occurs. Select this when the playback sound from the built-in TV speakers is distorted.

Note
The setting does not affect the output from the DIGITAL OUT OPTICAL and COAXIAL connectors.

■ **AUDIO DRC (Dynamic Range Control)**
Makes the sound clear when the volume is turned down when playing a DVD. This function works only when you play a DVD which has the AUDIO DRC function.
This affects the output from the DIGITAL OUT connectors only when "DOLBY DIGITAL" is set to "D-PCM" in "DIGITAL OUT," and it affects the output from the AUDIO OUT connectors.
- STANDARD: Normally select this position.
- TV MODE: makes the low sounds clear even if you turn the volume down. It is especially recommended when you listen to the sound using the speakers of the TV.
- WIDE RANGE: It gives you the feeling of being at a live performance. When you use high quality speakers, it is more effective.

Note
When you play DVDs without the AUDIO DRC function, there may be no effect on the sound.

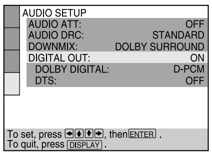
■ **DOWNMIX**
Switches the mixing down methods when you play a DVD on which rear signal components such as LS, RS or S are recorded in Dolby Digital format. For details on the rear signal components, see "Displaying the audio information of the disc" (page 31).
The "DOWNMIX" setting affects the following connectors:
– AUDIO OUT connectors
– DIGITAL OUT OPTICAL and COAXIAL connectors (when you set "DOLBY DIGITAL" to "D-PCM" in "AUDIO SETUP" in the setup display)
• DOLBY SURROUND: when the player is connected to an audio component that conforms to Dolby Surround (Pro Logic). The output signals which reproduce the Dolby Surround (Pro Logic) effect are mixed down to 2 channels.
• NORMAL: when the player is connected to an audio component that does not conform to Dolby Surround (Pro Logic). The signals without the Dolby Surround (Pro Logic) effect are output.

■ **DIGITAL OUT**
Selects output signals via the DIGITAL OUT OPTICAL and COAXIAL connectors.
• ON: Normally select this position. When you select "ON," set "DOLBY DIGITAL" and "DTS." For details on setting these items, see "Setting the Digital Output Signal."
• OFF: when the player does not output the sound signals via the DIGITAL OUT OPTICAL and COAXIAL connectors, the influence of the digital circuit upon the analog circuit is at a minimum.

Notes
• When you play sound tracks with a 96 kHz sampling frequency, the output signals from the DIGITAL OUT (OPTICAL, COAXIAL) are converted to 48 kHz (sampling frequency). When the signals are output from the AUDIO OUT connectors, sampling frequency stays at 96 kHz and the output signals are converted to analog signals.
• When you select "OFF," you cannot set "DOLBY DIGITAL," and "DTS."

Setting the Digital Output Signal

Switches the methods of outputting audio signals when you connect 1. a digital component such as a receiver (amplifier) having a digital connector, 2. an audio component having a built-in decoder (Dolby Digital or DTS), 3. a DAT or MD via the DIGITAL OUT OPTICAL or COAXIAL connector using an optical or coaxial digital connecting cord. For connection details, see pages 10 and 12.
When you select "ON," set "DOLBY DIGITAL" and "DTS."



■ **DOLBY DIGITAL**
Selects the Dolby Digital signals to be output via the DIGITAL OUT OPTICAL and COAXIAL connectors. You cannot select this item when you set "DIGITAL OUT" to "OFF."
• D-PCM (Downmix PCM): when the player is connected to an audio component lacking a built-in Dolby Digital decoder. If you play Dolby Digital sound tracks, the output audio signals are mixed down to 2 channels. You can select whether the signals conform to Dolby Surround (Pro Logic) or not by making adjustments to the "DOWNMIX" item in "AUDIO SETUP."
• DOLBY DIGITAL: when the player is connected to an audio component with a built-in Dolby Digital decoder. If the player is connected to an audio component lacking a built-in Dolby Digital decoder, do not set this. Otherwise, when you play the Dolby Digital sound track, a loud noise or no sound will come out from the speakers, affecting your ears or causing the speakers to be damaged.

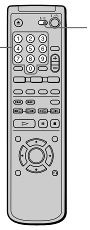
Note
When you select "D-PCM," set Virtual Enhanced Surround (VES) to "OFF." Otherwise, the player will not output signals from the DIGITAL OUT OPTICAL or COAXIAL connector.

■ **DTS**
Selects the DTS signals to be output via the DIGITAL OUT OPTICAL and COAXIAL connectors. You cannot select this item when you set "DIGITAL OUT" to "OFF."
• OFF: when the player is connected to an audio component lacking a built-in DTS decoder.
• ON: when the player is connected to an audio component having a built-in DTS decoder.
If the player is connected to an audio component lacking a built-in DTS decoder, do not set this. Otherwise, when you play the DTS sound track, a loud noise or no sound will come out from the speakers, affecting your ears or causing the speakers to be damaged.

Note
Select the setting correctly. Otherwise, no sound or a strange sound will come out from the speakers, affecting your ears or causing the speakers to be damaged.

Controlling your TV or AV Receiver (Amplifier) with the Supplied Remote

If you adjust the remote signal, you can control your TV or AV receiver (amplifier) with the supplied remote. Default setting is to control Sony TVs with the mark.



Controlling TVs or AV receivers (amplifiers) with the remote

Hold down TV I/⏻, and enter your TV's or AV receiver's manufacturer's code (see the table) using the number buttons. Then release TV I/⏻.

Code numbers of controllable TVs or AV receivers (amplifiers)
If more than one code number is listed, try entering them one at a time until you find the one that works with your TV or AV receiver (amplifier).

Notes
• If you enter a new code number, the code number previously entered will be erased.
• When you replace the batteries of the remote commander, the code number reset to 01 (Sony). Reset the appropriate code number.

TV

Manufacturer	Code number
Sony (default)	01
Akai	04
AOC	04
Centurion	12
Coronado	03
Curis-Mathes	12
Daytron	12
Emerson	03, 04, 14
Fisher	11
General Electric	06, 10
Gold Star	03, 04, 17
Hitachi	02, 03
J.C.Penny	04, 12
JVC	09
KMC	03
Magnavox	03, 08, 12
Marantz	04, 13
MGA/Mitsubishi	04, 12, 13, 17
NEC	04, 12

Manufacturer	Code number
Panasonic	06, 19
Philco	03, 04
Philips	08
Pioneer	16
Portland	03
Quasar	06, 18
Radio Shack	05, 14
RCA	04, 10
Sampo	12
Sanyo	11
Scott	12
Sears	07, 10, 11
Sharp	03, 05, 18
Sylvania	08, 12
Teknika	03, 08, 14
Toshiba	07
Wards	03, 04, 12
Yorx	12
Zenith	15

AV receiver (amplifier)

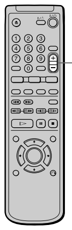
Manufacturer	Code number
Sony	91, 89
Denon	84, 85, 86
Kenwood	92, 93
Onkyo	81, 82, 83
Pioneer	99
Sansui	87
Technics	97, 98
Yamaha	94, 95, 96

You can control your TV using the keys below.

By pressing	You can
TV I/⏻	Turn the TV on or off
TV/VIDEO	Switch the TV's input source between the TV and other input sources
VOL	Adjust the volume of the TV

Note
Depending on the TV, you may not be able to control your TV or to use some of the buttons above.

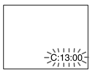
You can also change the sound volume of the AV receiver (amplifier) using VOL.



Note
Depending on the AV receiver (amplifier), you may not be able to control your AV receiver (amplifier).

Self-diagnosis function

When the self-diagnosis function activates to prevent the player from malfunctioning, a five-character service number (combination of a letter and digits) flashes on the screen and on the front panel display. In this case, check the following table.



First three characters	Cause and/or Corrective Action
C13	• The disc is dirty. ➡ Clean the disc with a cleaning cloth. (page 6)
C31	• The disc is not inserted correctly. ➡ Open the disc tray and insert the disc correctly.
Exx (xx is any number)	• To prevent a malfunction, the player has performed the self-diagnosis function. ➡ When you contact your Sony dealer or local authorized Sony service facility, give the 5-character service number. (example: E:61:10)

Language Code List

For details, see page 32, 46.

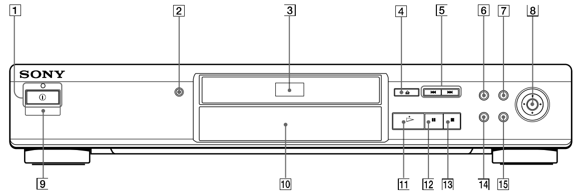
The language spellings conform to the ISO 639: 1988 (E/F) standard.

Code	Language	Code	Language	Code	Language	Code	Language
1027	Afar	1186	Scots Gaelic	1350	Malayalam	1513	Siswati
1028	Abkhazian	1194	Galician	1352	Mongolian	1514	Sesotho
1032	Afrikaans	1196	Guarani	1353	Moldavian	1515	Sundanese
1039	Amharic	1203	Gujarati	1356	Marathi	1516	Swedish
1044	Arabic	1209	Hausa	1357	Malay	1517	Swahili
1045	Assamese	1217	Hindi	1358	Maltese	1521	Tamil
1051	Aymara	1226	Croatian	1363	Burmese	1525	Telugu
1052	Azerbaijani	1229	Hungarian	1365	Nauru	1527	Tajik
1053	Bashkir	1233	Armenian	1369	Nepali	1528	Thai
1057	Byelorussian	1235	Interlingua	1376	Dutch	1529	Tigrinya
1059	Bulgarian	1239	Interlingue	1379	Norwegian	1531	Turkmen
1060	Bihari	1245	Inupiak	1393	Occitan	1532	Tagalog
1061	Bislama	1248	Indonesian	1403	(Afan) Oromo	1534	Setswana
1066	Bengali; Bangla	1253	Icelandic	1408	Oriya	1535	Tonga
1067	Tibetan	1254	Italian	1417	Punjabi	1538	Turkish
1070	Breton	1257	Hebrew	1428	Polish	1539	Tsonga
1079	Catalan	1261	Japanese	1435	Pashto; Pushto	1540	Tatar
1093	Corsican	1269	Yiddish	1436	Portuguese	1543	Twi
1097	Czech	1283	Javanese	1463	Quechua	1557	Ukrainian
1103	Welsh	1287	Georgian	1481	Rhaeto-Romance	1564	Urdu
1105	Danish	1297	Kazakh	1482	Kirundi	1572	Uzbek
1109	German	1298	Greenlandic	1483	Romanian	1581	Vietnamese
1130	Bhutani	1299	Cambodian	1489	Russian	1587	Volapük
1142	Greek	1300	Kannada	1491	Kinyarwanda	1613	Wolof
1144	English	1301	Korean	1495	Sanskrit	1632	Xhosa
1145	Esperanto	1305	Kashmiri	1498	Sindhi	1665	Yoruba
1149	Spanish	1307	Kurdish	1501	Sangho	1684	Chinese
1150	Estonian	1311	Kirghiz	1502	Serbo-Croatian	1697	Zulu
1151	Basque	1313	Latin	1503	Singhalese	1703	Not specified
1157	Persian	1326	Lingala	1505	Slovak		
1165	Finnish	1327	Laothian	1506	Slovenian		
1166	Fiji	1332	Lithuanian	1507	Samoan		
1171	Faroese	1334	Latvian; Lettish	1508	Shona		
1174	French	1345	Malagasy	1509	Somali		
1181	Frisian	1347	Maori	1511	Albanian		
1183	Irish	1349	Macedonian	1512	Serbian		

Index to Parts and Controls

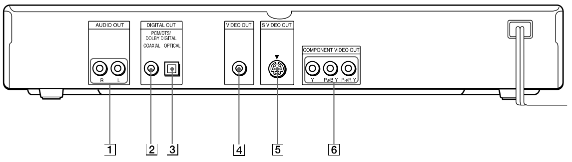
Refer to the pages indicated in parentheses for details.

Front Panel



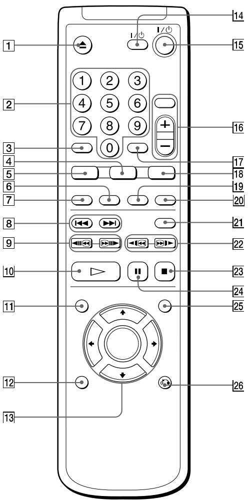
1 ⏻ (power) button and indicator (16)
Disconnects the power of the player or places the player in standby mode.
2 VES (Virtual Enhanced Surround) button and indicator (33)
Press to select the desired "VES" item. The indicator lights up for every selected item except "OFF."
3 Disc tray (16)
Place a disc on the tray.
4 ⏏OPEN/CLOSE button (16)
Opens or closes the disc tray.
5 I◀◀/▶▶I PREV/NEXT (previous/next) buttons (17)
Press to go to the next chapter or track, or to go back to the previous chapter or track.
6 TITLE button (20)
Displays the title menu on the TV screen.
7 DVD MENU button (20)
Displays the DVD menu on the TV screen.
8 ←/↑/↓/→/ENTER button
Selects and executes the items or settings.
9 (remote sensor) (7)
Accepts the remote control signals.
10 Front Panel Display (22)
Indicates the playing time, etc.
11 ▷ (play) button (16)
Plays a disc.
12 II (pause) button (17)
Pauses playing a disc.
13 ■ (stop) button (17, 19)
Stops playing a disc.
14 DISPLAY button (24)
Displays the Control Menu display on the TV screen to set or adjust the Control Menu items.
15 RETURN button (21, 25)
Press to return to the previously selected screen, etc.

Rear Panel



1 AUDIO OUT R (right)/L (left) connectors (8, 10)
Connect to the audio input connector on your TV or receiver (amplifier).
2 DIGITAL OUT COAXIAL connector (10, 12)
Connect to an audio component using a coaxial digital connecting cord.
3 DIGITAL OUT OPTICAL connector (10, 12)
Connect to an audio component using an optical digital connecting cord. Take off the cap.
4 VIDEO OUT connector (8)
Connect to the video input connector on your TV or monitor.
5 S VIDEO OUT connector (8, 10)
Connect to the S video input connector on your TV or monitor.
6 COMPONENT VIDEO OUT connectors (9)
Connect to a monitor or projector having component video input connectors (Y, PB/B-Y, PR/R-Y) that conform to output signals from the player.

Remote

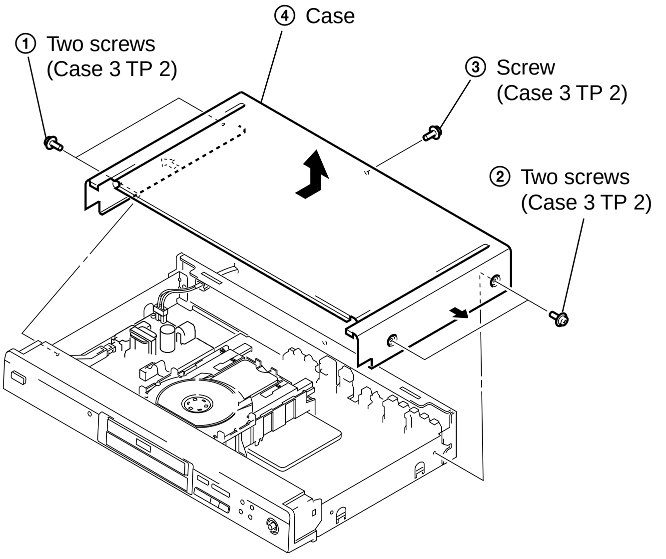


1 ⏏OPEN/CLOSE button (17)
Opens or closes the disc tray.
2 Number buttons
Selects the items or settings.
3 CLEAR button (27, 38)
Press to return to continuous play, etc.
4 ANGLE button (33)
Changes the angles when playing a DVD.
5 AUDIO button (30)
Changes the sound while playing a DVD or VIDEO CD.
6 PROGRAM button (39)
Displays the "PROGRAM" display on the TV screen.
7 SHUFFLE button (40)
Changes the "SHUFFLE" mode.
8 I◀◀/▶▶I PREV/NEXT (previous/next) buttons (17)
Press to go to the next chapter or track, or to go back to the previous chapter or track.
9 ◀II/II▶ SEARCH/STEP buttons (18)
While monitoring the picture, keep pressing to locate a point quickly or press sequentially to play a disc frame by frame.
10 ▷PLAY button (16)
Plays a disc.
11 TITLE button (20)
Displays the title menu on the TV screen.
12 DISPLAY button (24)
Displays the Control Menu display on the TV screen to set or adjust the items.
13 ←/↑/↓/→/ENTER buttons
Selects and executes the items or settings.
14 TV I/⏻ (television on/standby) button (53)
Turns on and off the power of the TV.
15 I/⏻ (on/standby) button (17)
Press to turn on the player or place it in standby mode after power is connected by pressing ⏻ on the player.
16 TV (television)/AV receiver (amplifier) operation buttons (53)
Controls TVs or AV receivers (amplifiers).
17 ENTER button
Executes the items or settings.
18 SUBTITLE button (32)
Changes the subtitles when playing a DVD.
19 REPEAT button (41)
Changes the "REPEAT" mode.
20 A-B button (42)
Displays the "A-B REPEAT" display on the TV screen.
21 TIME/TEXT button (22)
Displays the playing time of the disc, etc., on the front panel display.
22 ◀I/I▶ SCAN/SLOW buttons (18)
Locate a point quickly while monitoring the picture or play a disc in slow motion.
23 ■STOP button (17, 19)
Stops playing a disc.
24 IIPAUSE button (17)
Pauses playing a disc.
25 DVD MENU button (20)
Displays the DVD menu on the TV screen.
26 RETURN button (21, 25)
Press to return to the previously selected screen, etc.

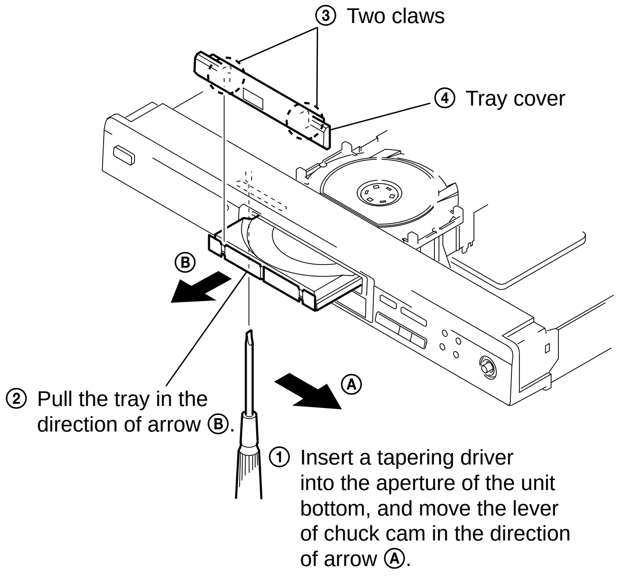
SECTION 2
DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

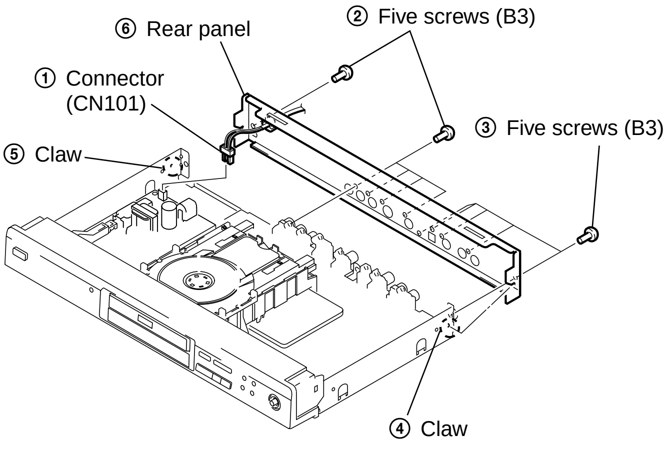
2-1. CASE REMOVAL



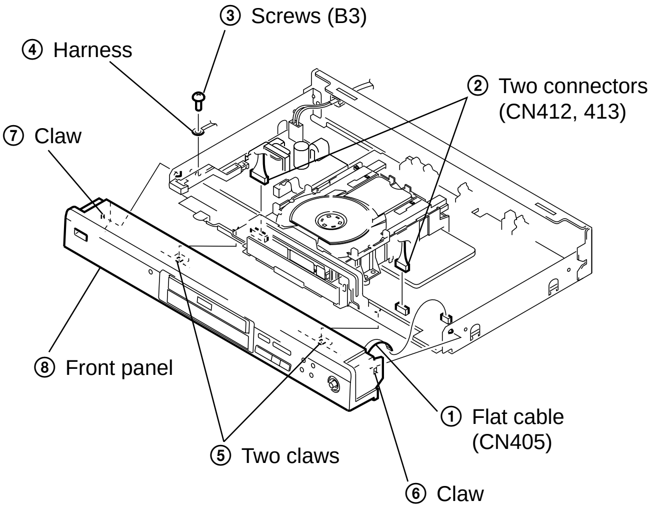
2-3. TRAY COVER REMOVAL



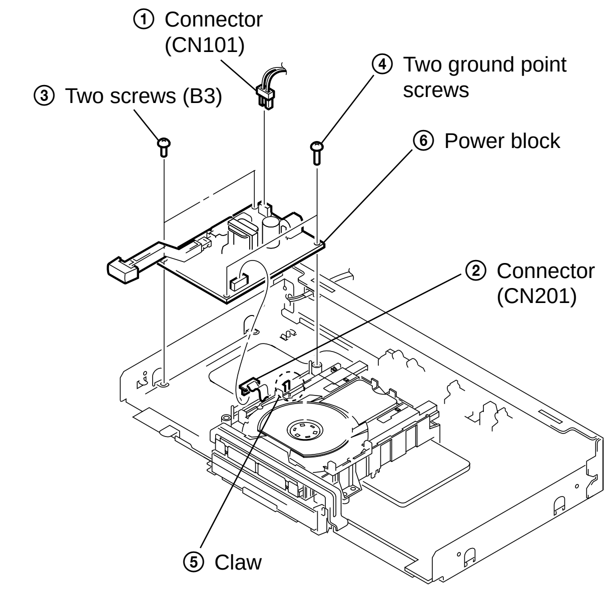
2-2. REAR PANEL REMOVAL



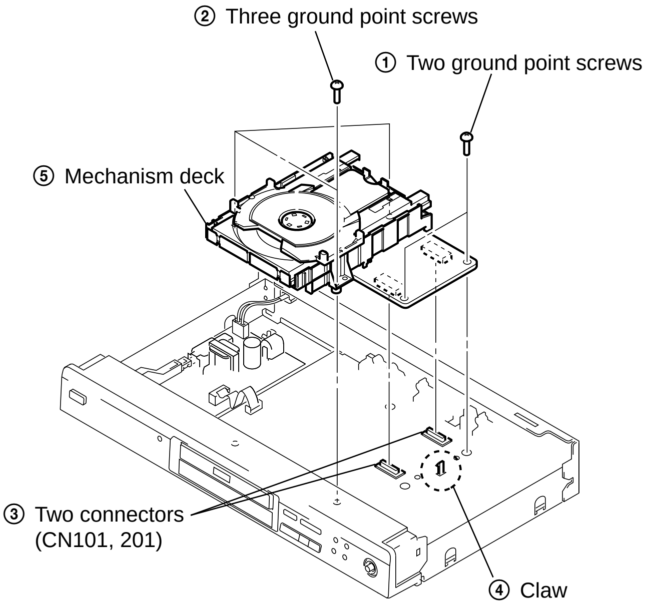
2-4. FRONT PANEL REMOVAL



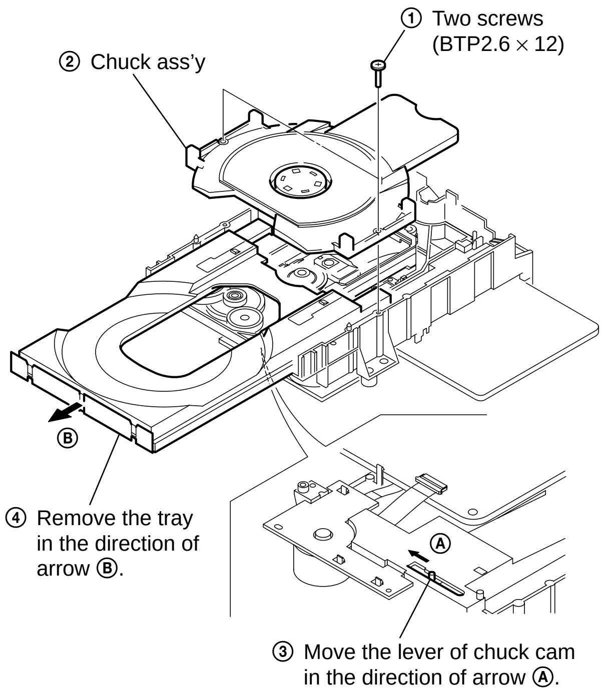
2-5. POWER BLOCK REMOVAL



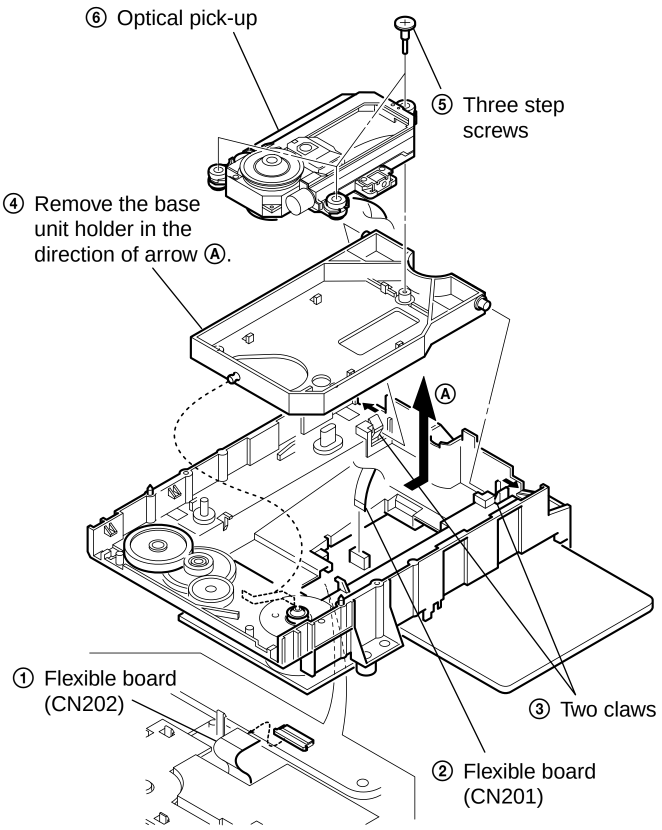
2-6. MECHANISM DECK REMOVAL



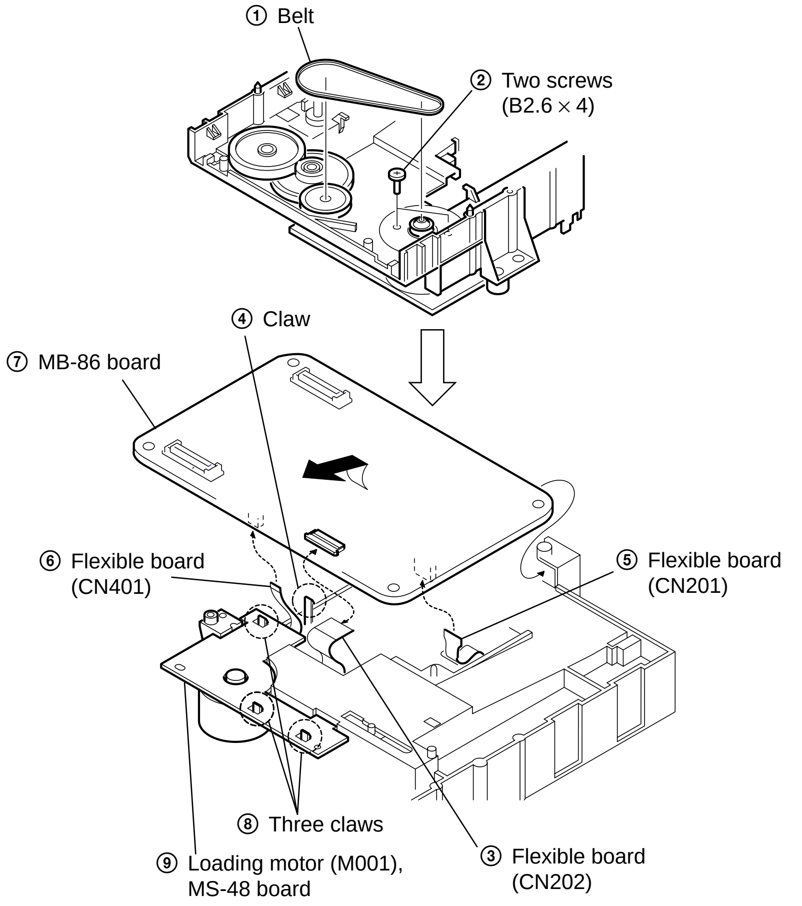
2-7. TRAY REMOVAL



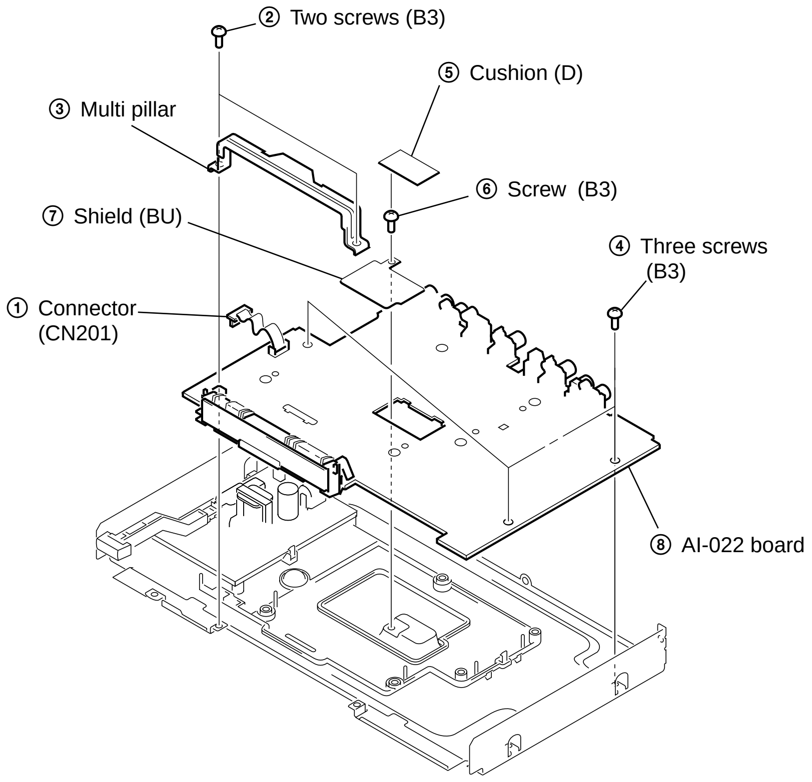
2-8. OPTICAL PICK-UP REMOVAL



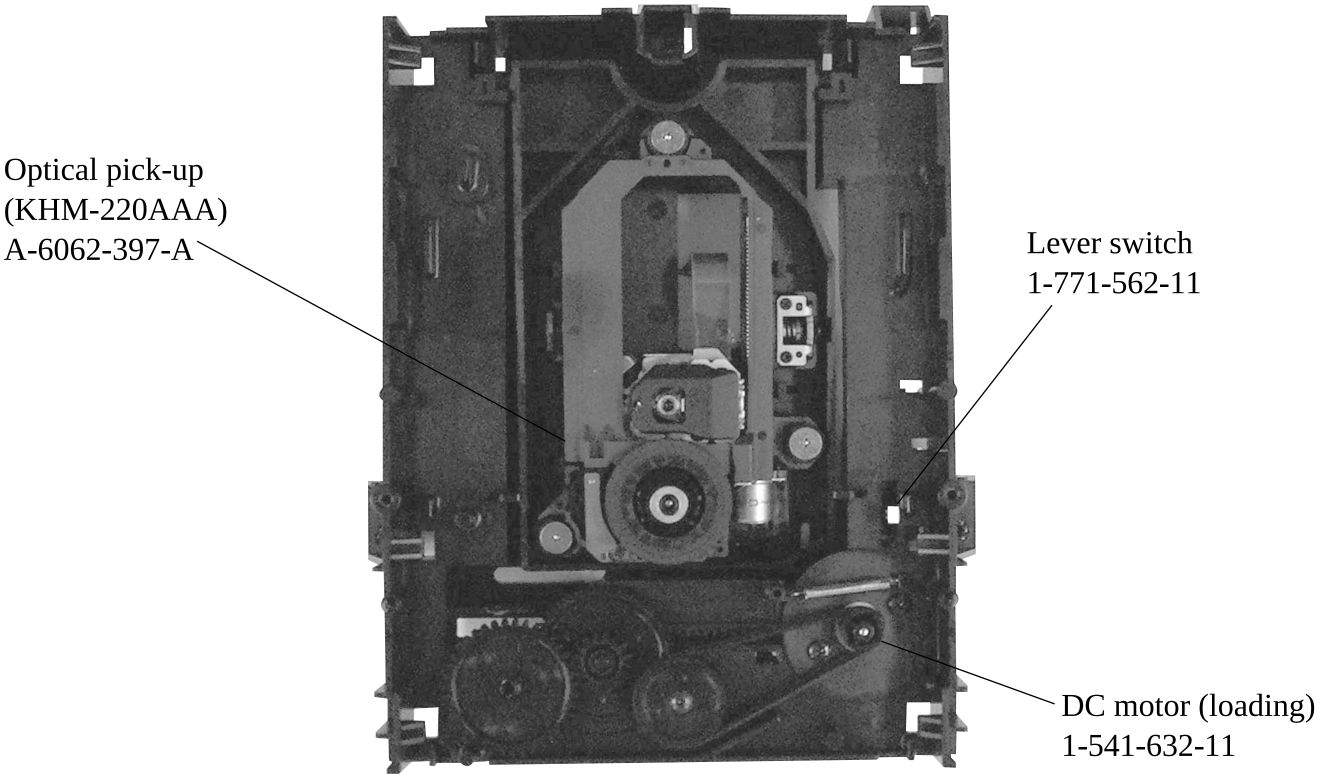
2-9. BELT, MB-86 BOARD, LOADING MOTOR (M001), MS-48 BOARD REMOVAL

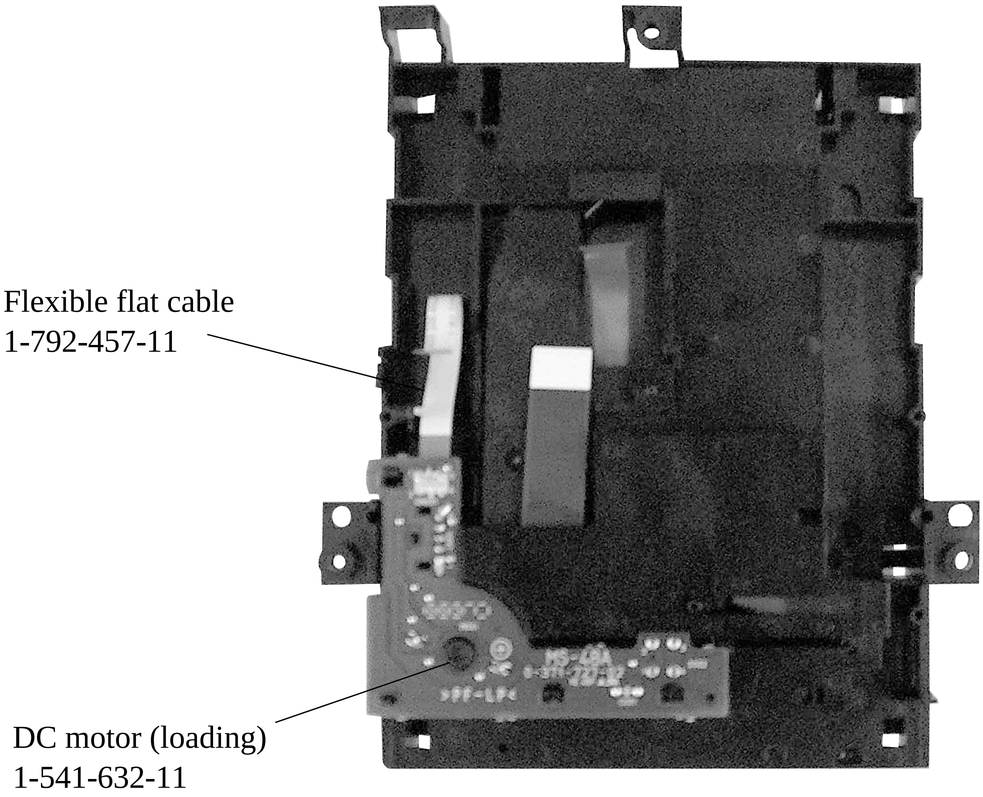


2-10. AI-022 BOARD REMOVAL

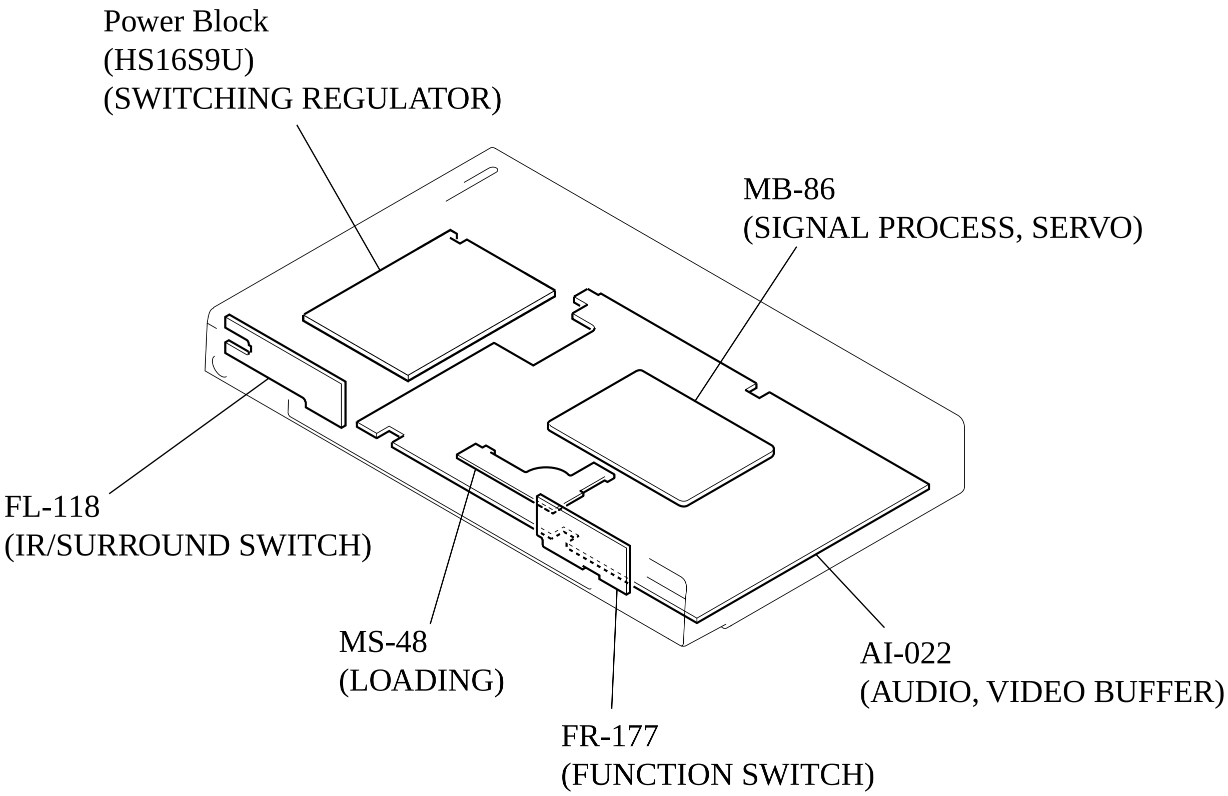


2-11. INTERNAL VIEWS



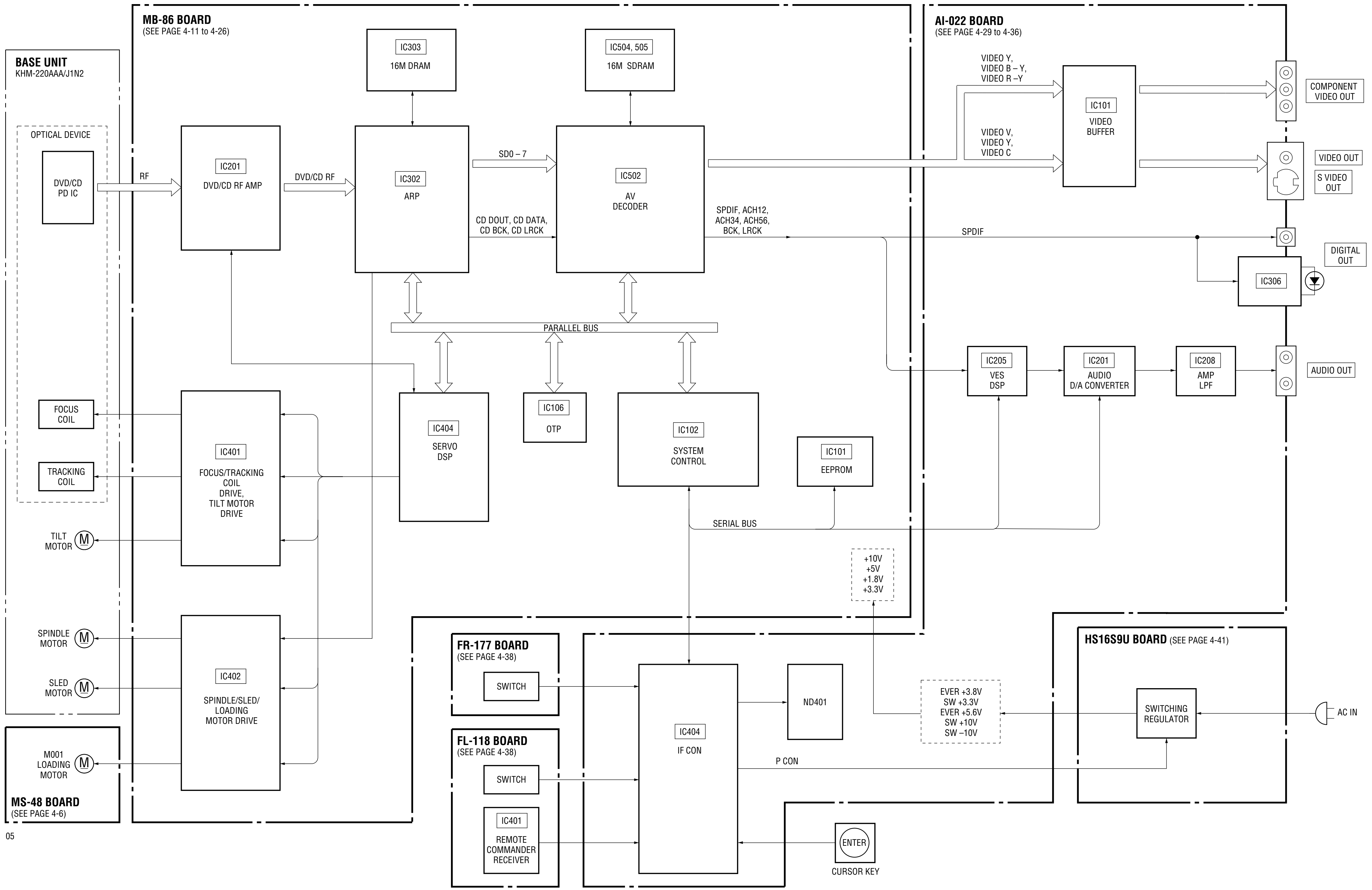


2-12. CIRCUIT BOARDS LOCATION

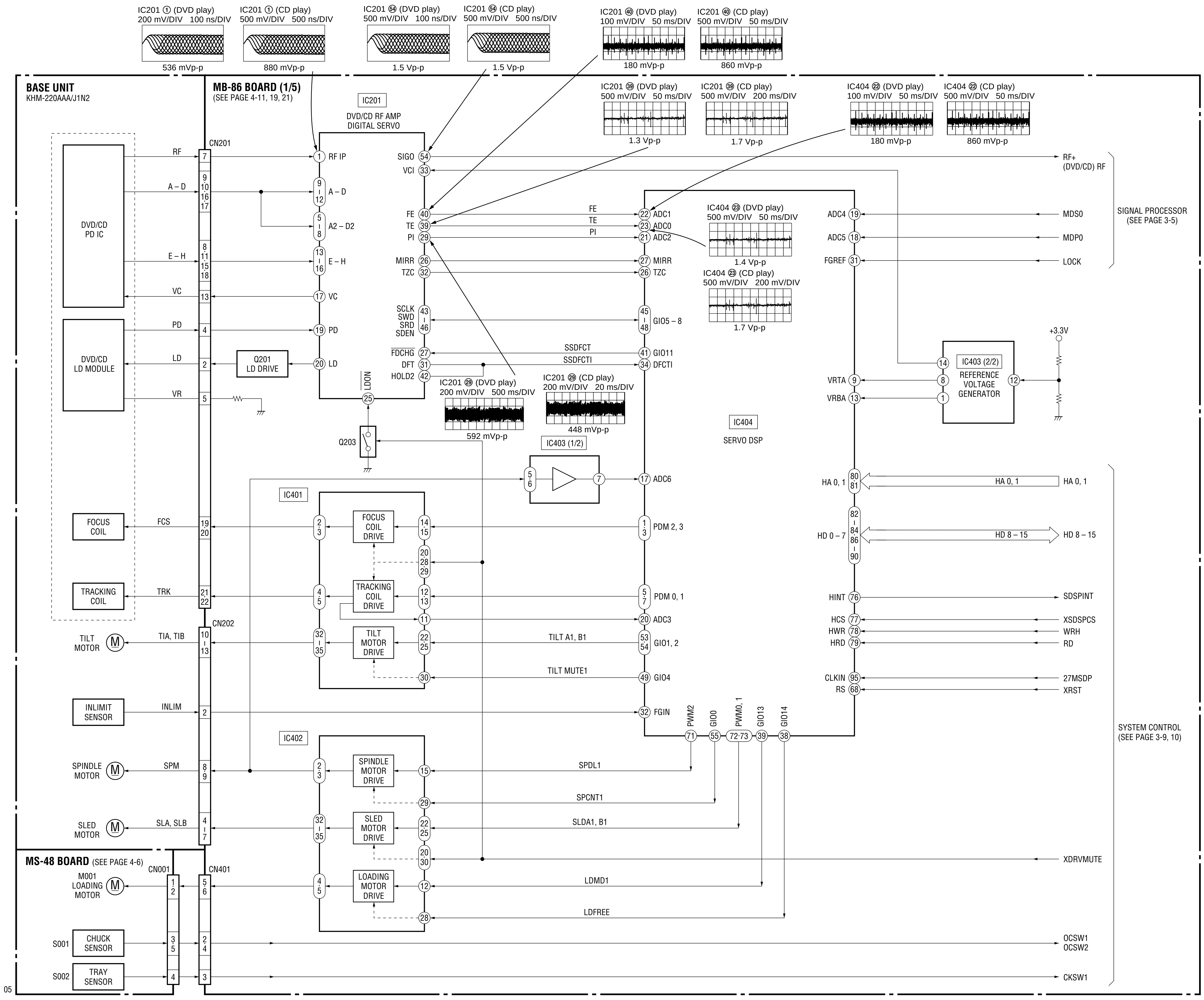


SECTION 3
BLOCK DIAGRAMS

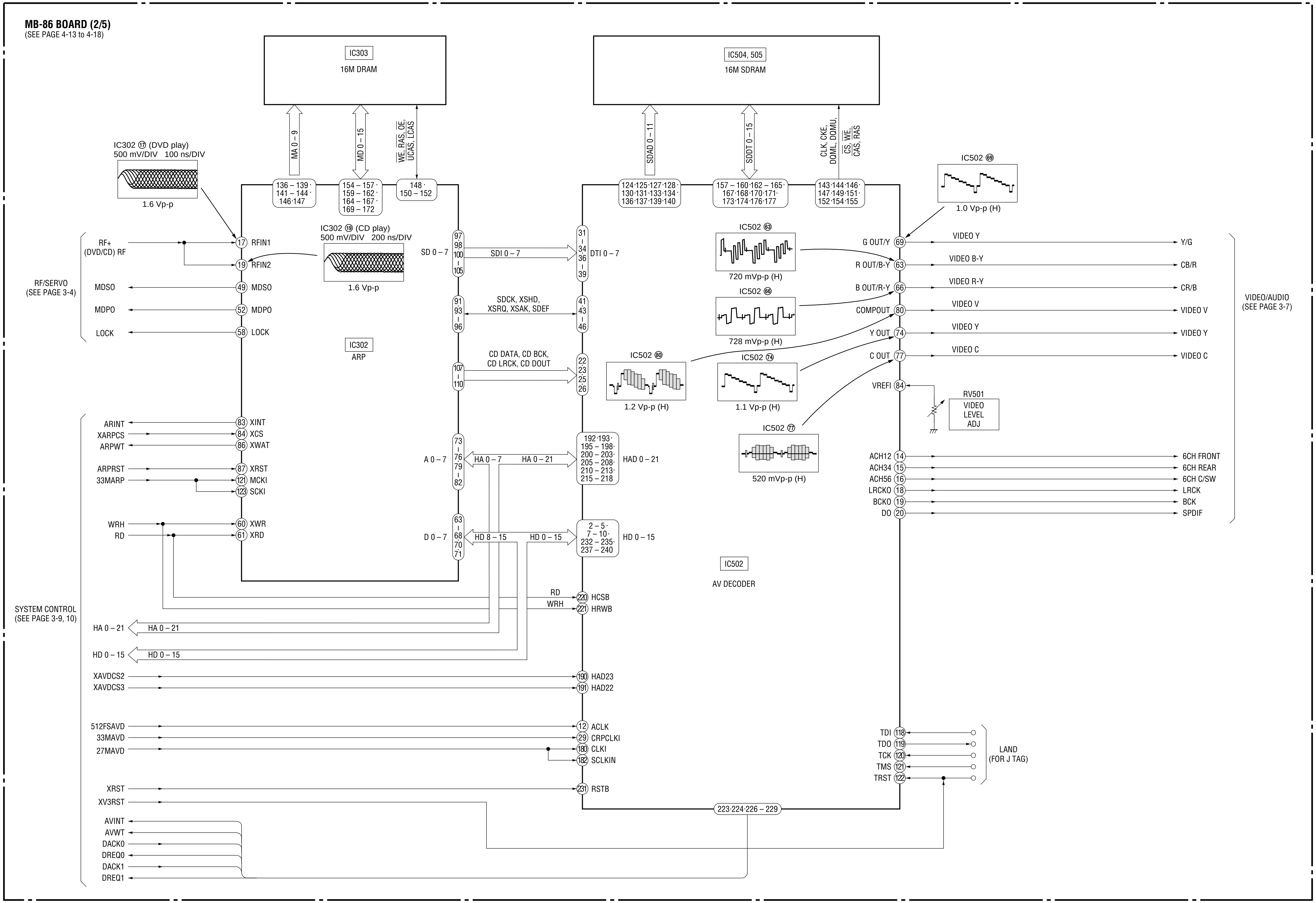
3-1. OVERALL BLOCK DIAGRAM



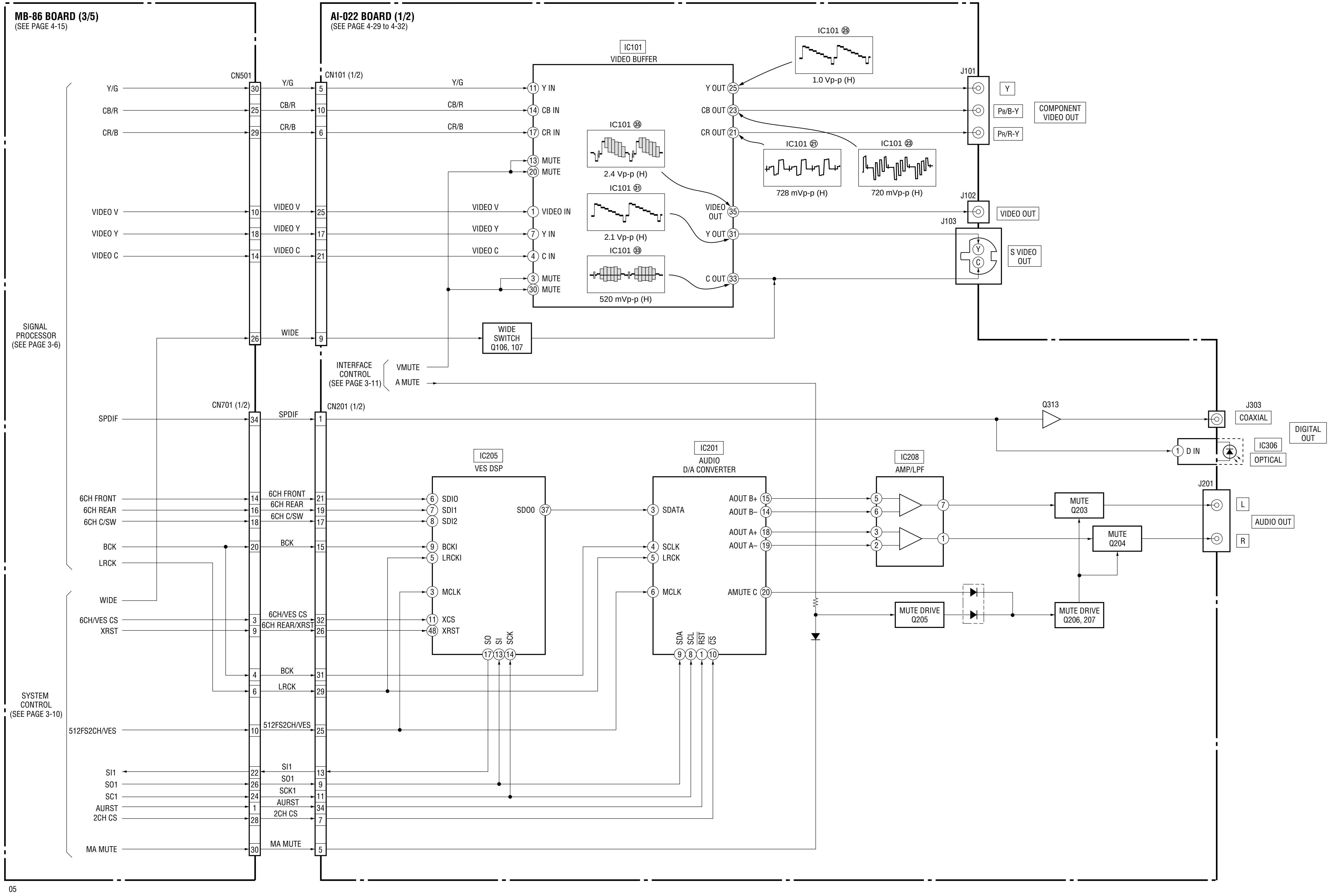
3-2. RF/SERVO BLOCK DIAGRAM



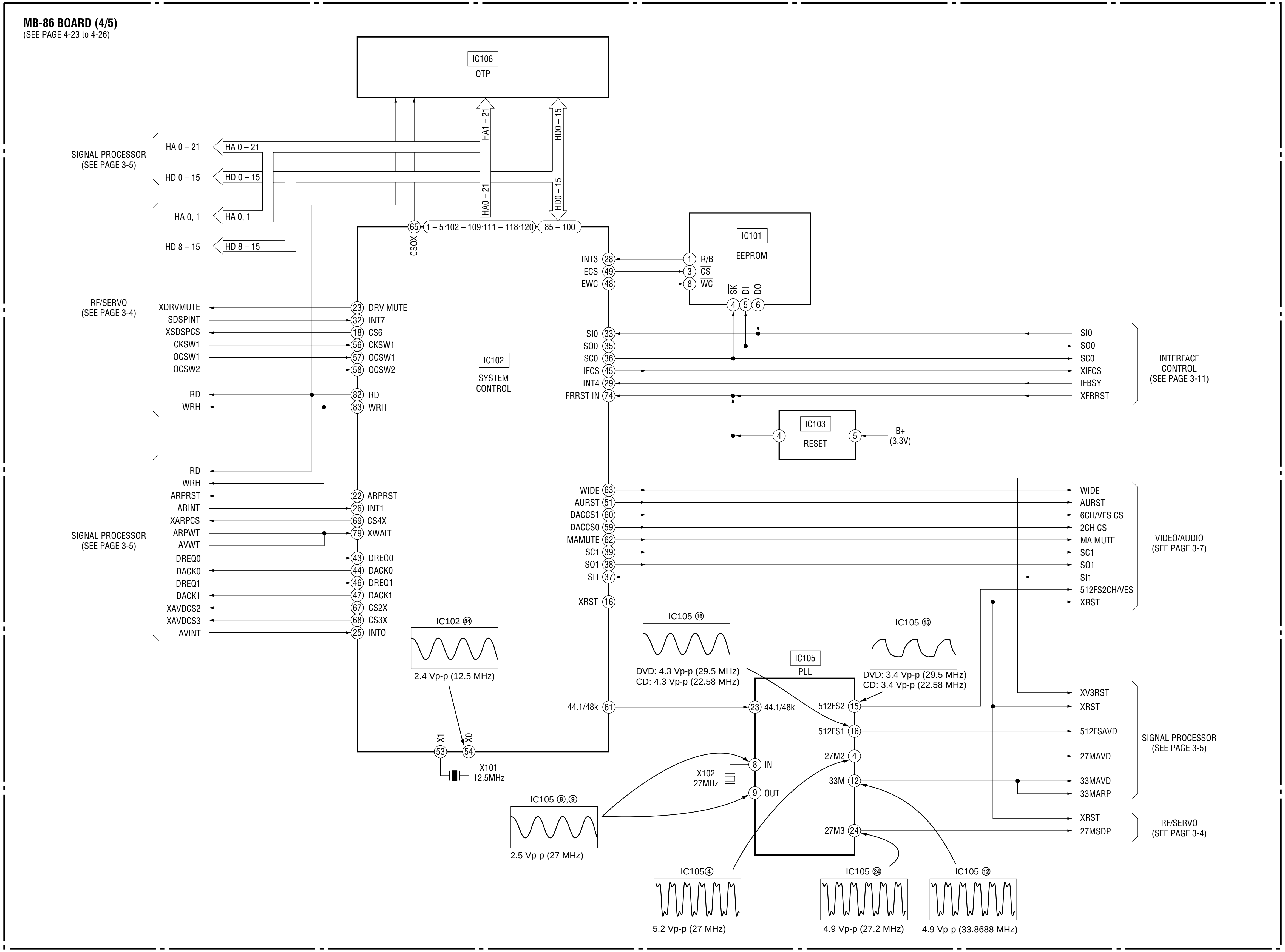
3-3. SIGNAL PROCESSOR BLOCK DIAGRAM



3-4. VIDEO/AUDIO BLOCK DIAGRAM

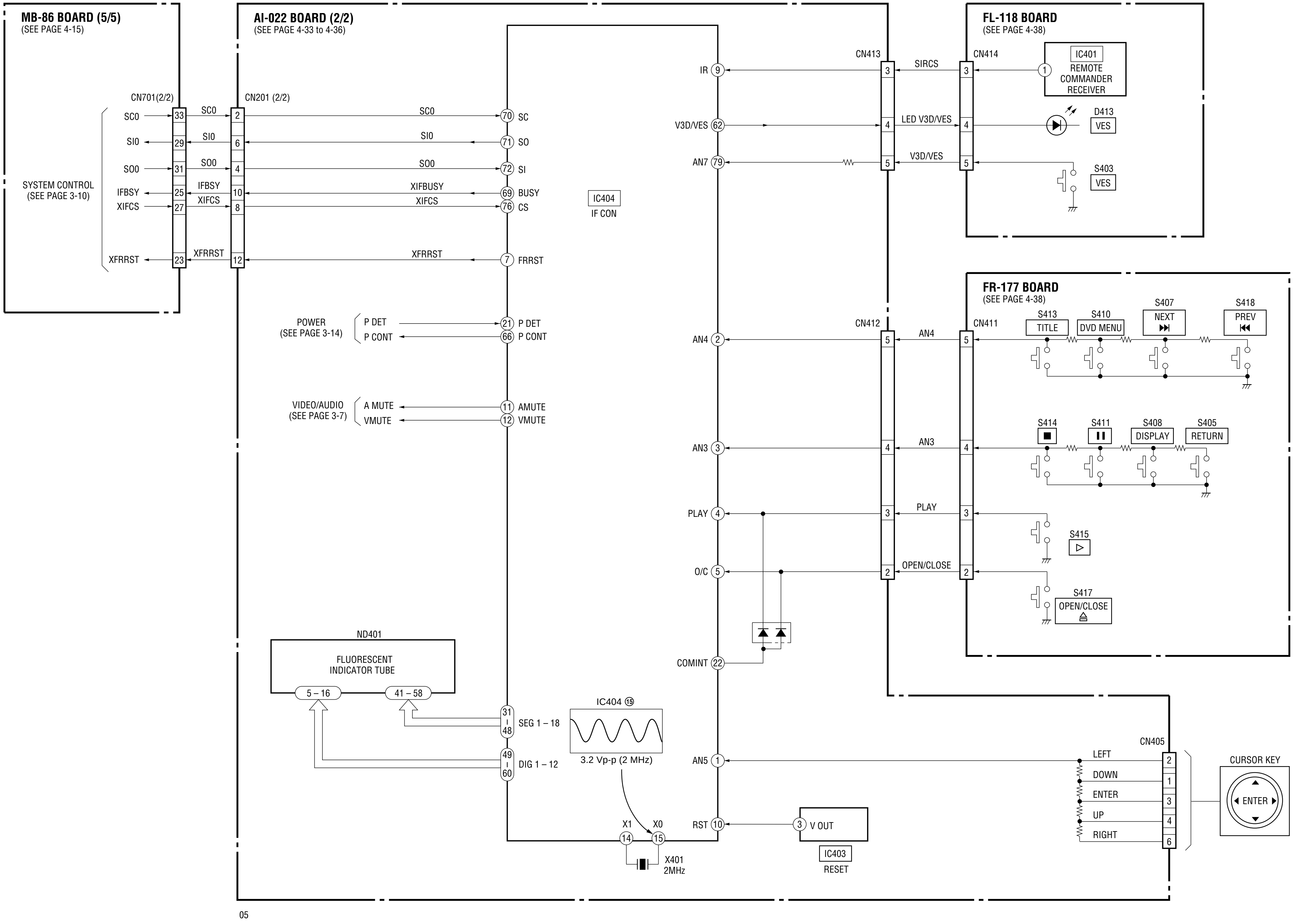


3-5. SYSTEM CONTROL BLOCK DIAGRAM

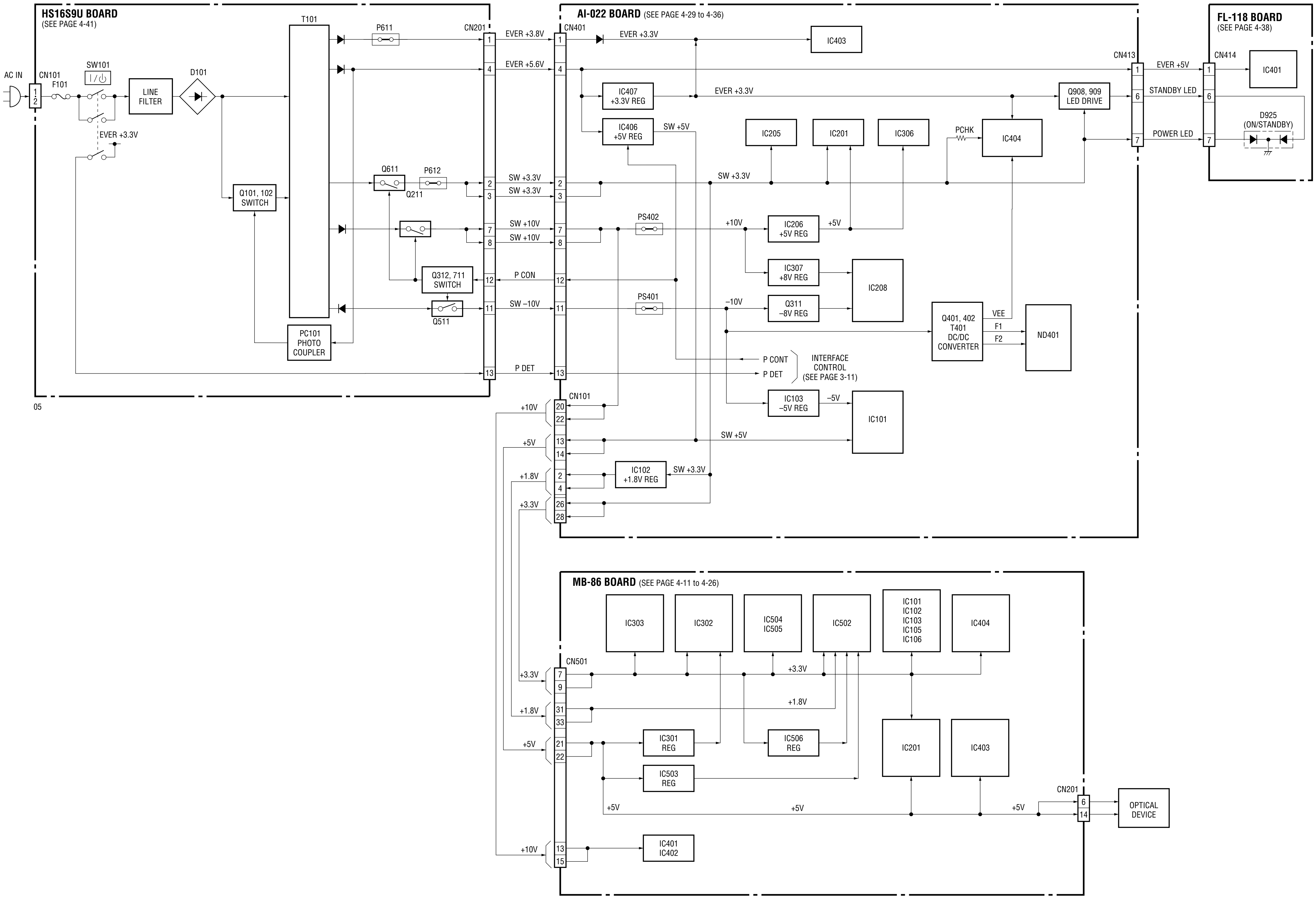


05

3-6. INTERFACE CONTROL BLOCK DIAGRAM



3-7. POWER BLOCK DIAGRAM



SECTION 4
PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS.
(In addition to this, the necessary note is printed in each block.)

For printed wiring boards:
- o——— : indicates a lead wire mounted on the component side.
- •——— : indicates a lead wire mounted on the printed side.
- ○ : Through hole.
- ░░░ : Pattern from the side which enables seeing.

(The other layers' patterns are not indicated.)

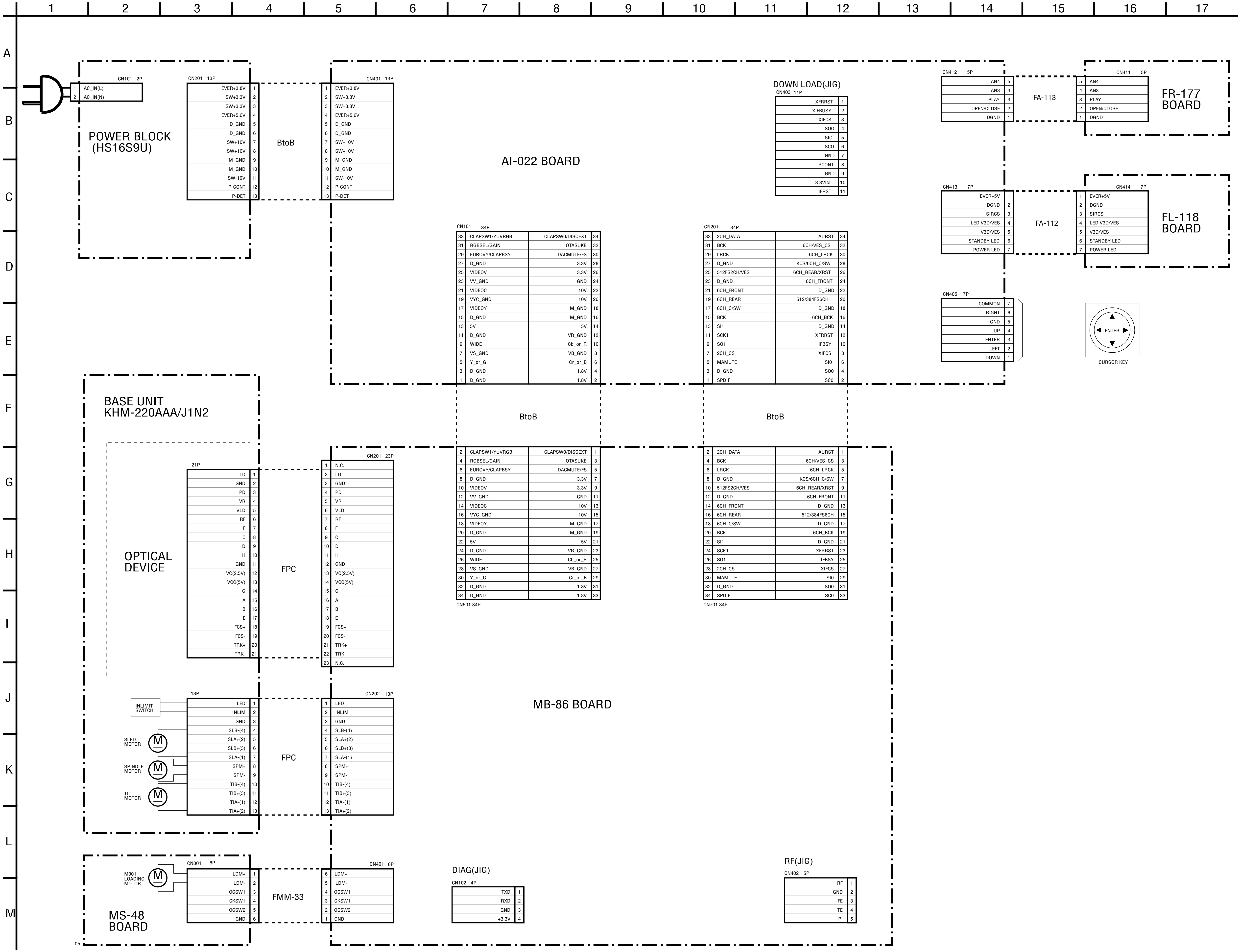
Caution:	
Pattern face side: (Side B)	Parts on the pattern face side seen from the pattern face are indicated.
Parts face side: (Side A)	Parts on the parts face side seen from the parts face are indicated.

For schematic Diagram:
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minus side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, $^{1}/_{4}$ W (Chip resistors : $^{1}/_{10}$ W) unless otherwise specified.
  kΩ : 1000Ω, MΩ : 1000kΩ.
- All capacitors are in μF unless otherwise noted. pF : μμF
  50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : nonflammable resistor.
- : fusible resistor.
- ▭ : panel designation.
- △ : internal component.
- ▭ : adjustment for repair.
- **B +** : B+ Line.
- **B –** : B– Line.
- Circled numbers refer to waveforms.
- Voltages are dc between measurement point.
- Readings are taken with a color-bar signals on DVD reference disc and when playing CD reference disc.
- Readings are taken with a digital multimeter (DC 10MΩ).
- Voltage variations may be noted due to normal production tolerances.

Note: The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

When indicating parts by reference number, please include the board name.

4-1. FRAME SCHEMATIC DIAGRAM

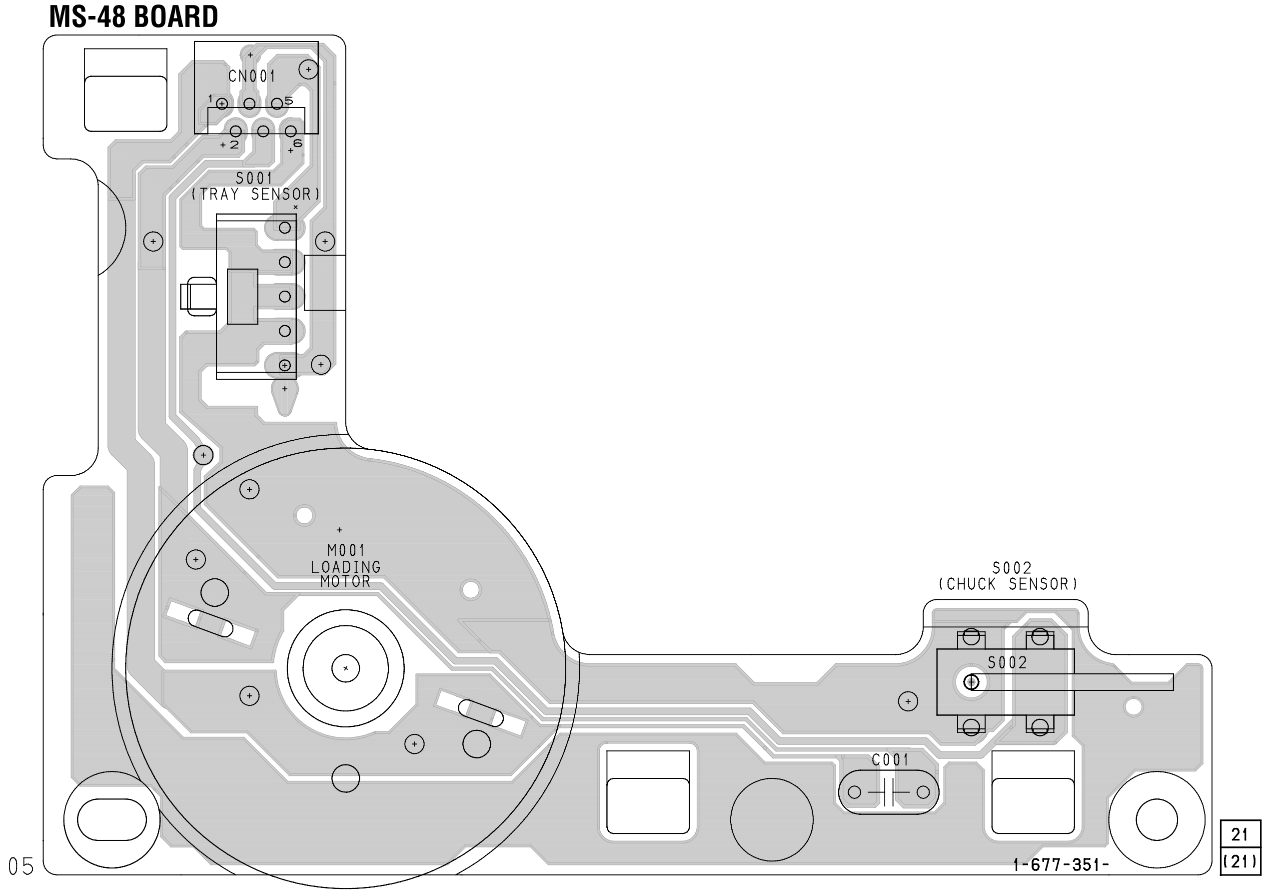


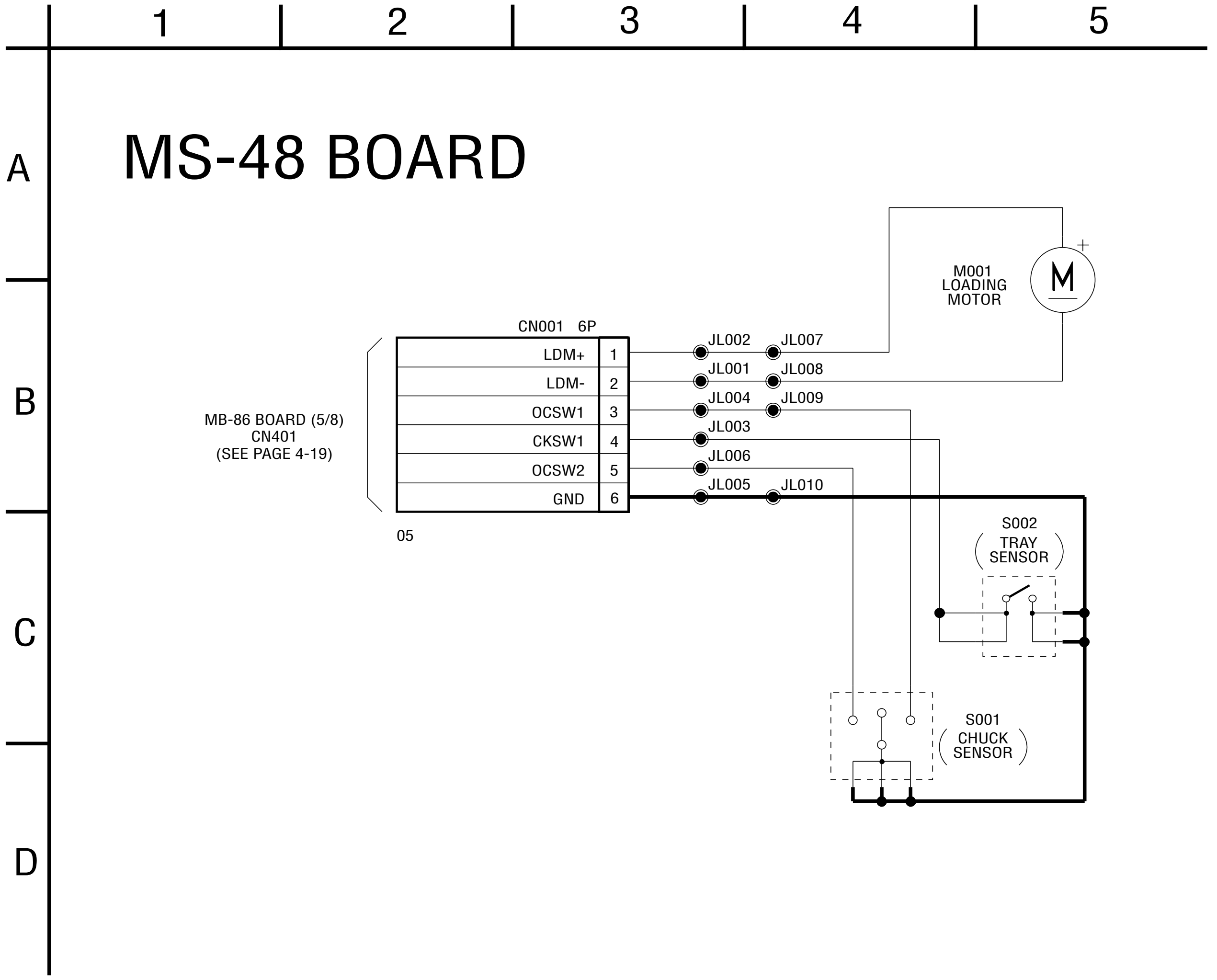
4-2. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

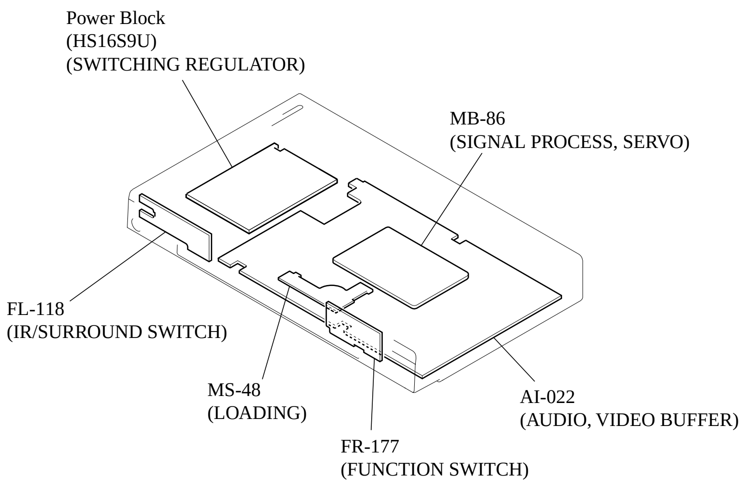
MS-48 (LOADING) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

– Ref. No.: MS-48 board; 2,000 series –

There are few cases that the part isn't mounted in this model is printed on this diagram.







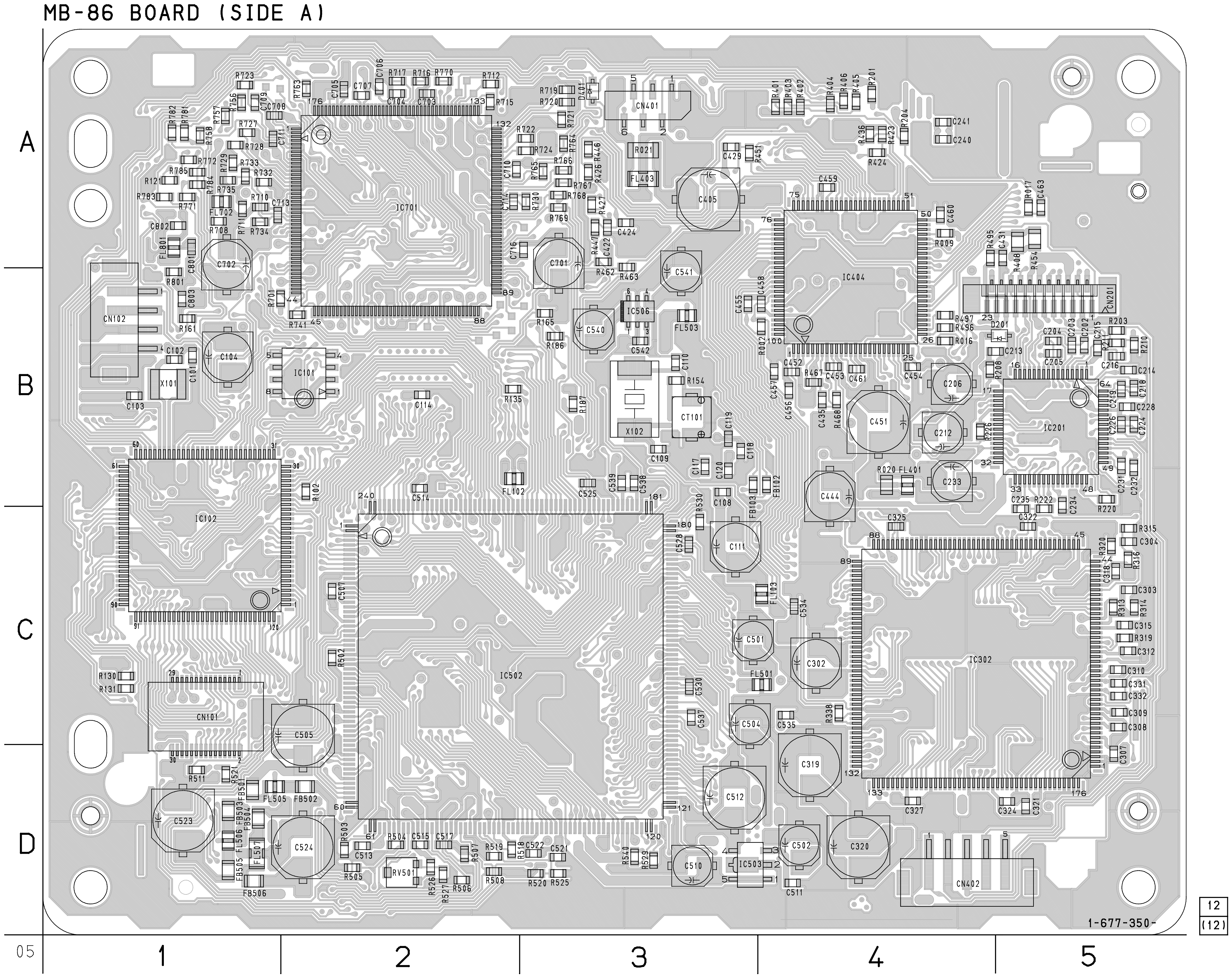
There are few cases that the part isn't mounted in this model is printed on this diagram.

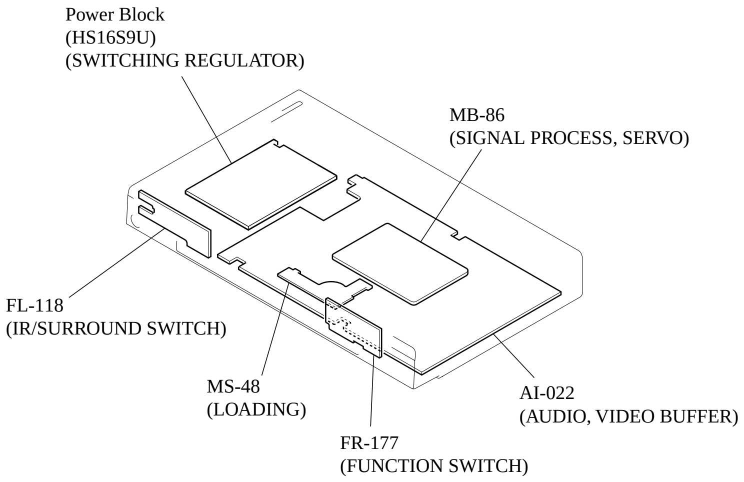
MB-86 (SIGNAL PROCESS, SERVO) PRINTED WIRING BOARD

– Ref. No.: MB-86 board; 1,000 series –

MB-86 BOARD (SIDE A)

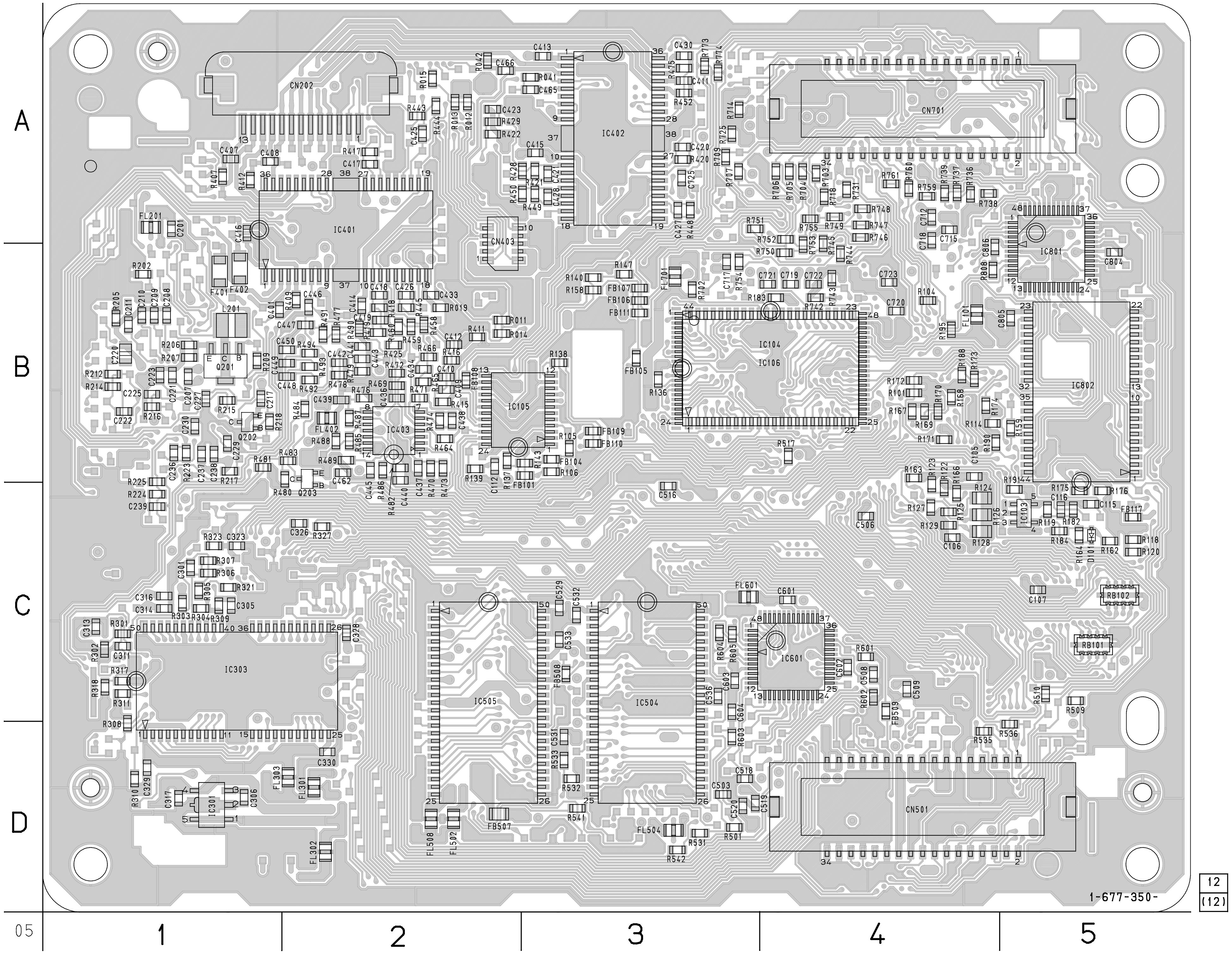
CN102	B-1
CN201	B-5
CN401	A-3
CN402	D-4
D201	B-5
IC101	B-2
IC102	C-1
IC201	B-5
IC302	C-4
IC404	B-4
IC502	C-2
IC503	D-3
IC506	B-3





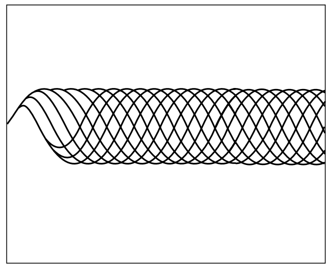
SIGNAL PROCESS, SERVO
MB-86

MB-86 BOARD (SIDE B)



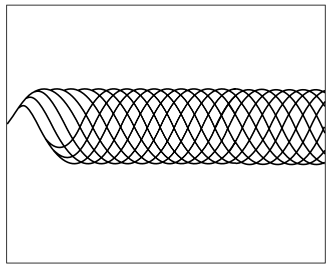
• **Waveforms**

❶ IC201 ① (DVD play)
200 mV/DIV 100 ns/DIV



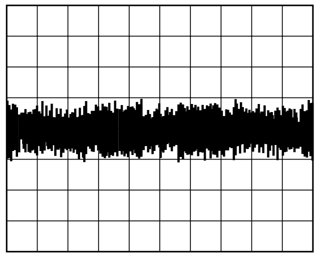
536 mVp-p

❶ IC201 ① (CD play)
500 mV/DIV 500 ns/DIV



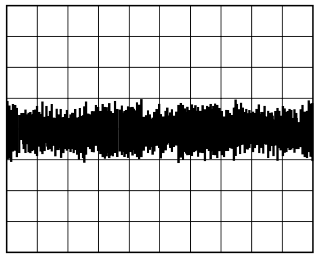
880 mVp-p

❷ IC201 ㉙ (DVD play)
200 mV/DIV 500 ms/DIV



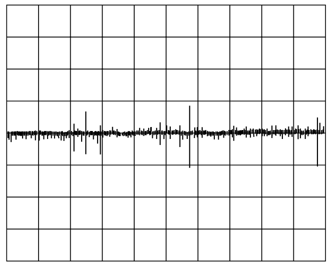
592 mVp-p

❷ IC201 ㉙ (CD play)
200 mV/DIV 20 ms/DIV



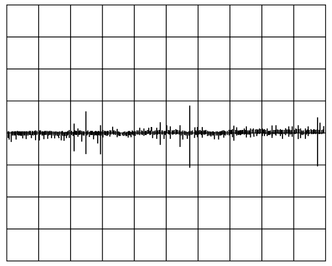
448 mVp-p

❸ IC201 ㊴ (DVD play)
500 mV/DIV 50 ms/DIV



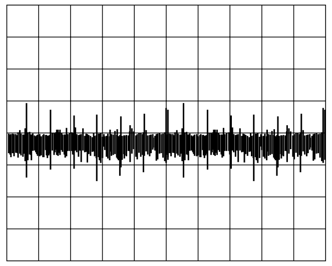
1.3 Vp-p

❸ IC201 ㊴ (CD play)
500 mV/DIV 200 ms/DIV



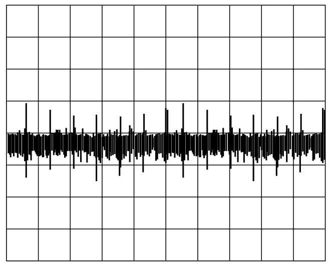
1.7 Vp-p

❹ IC201 ㊵ (DVD play)
100 mV/DIV 50 ms/DIV



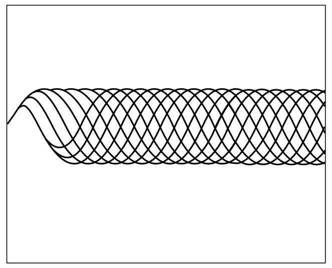
180 mVp-p

❹ IC201 ㊵ (CD play)
500 mV/DIV 50 ms/DIV



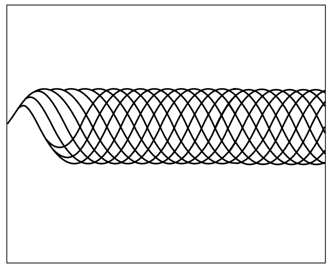
860 mVp-p

❺ IC201 ㊹ (DVD play)
500 mV/DIV 100 ns/DIV



1.5 Vp-p

❺ IC201 ㊹ (CD play)
500 mV/DIV 500 ns/DIV



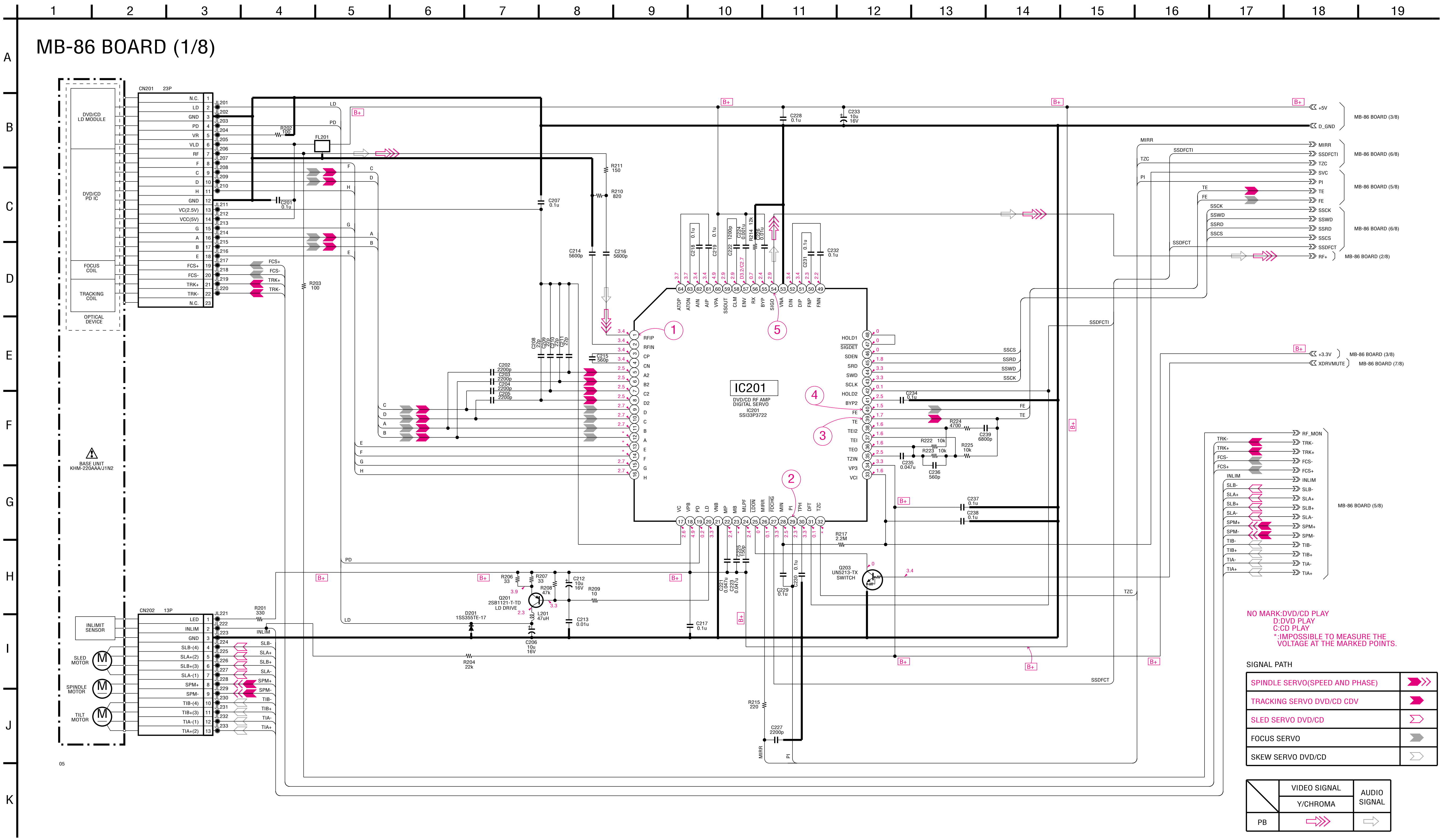
1.5 Vp-p

MB-86 BOARD (SIDE B)

CN202	A-2	IC303	C-1
CN501	D-4	IC401	A-2
CN701	A-4	IC402	A-3
		IC403	B-2
D101	C-5	IC504	C-3
		IC505	C-2
IC103	C-5		
IC105	B-2	Q201	B-1
IC106	B-4	Q203	B-1
IC301	D-1		

MB-86 (RF AMP, SERVO) SCHEMATIC DIAGRAM • See page 4-7 for printed wiring board and page 4-10 for waveforms.

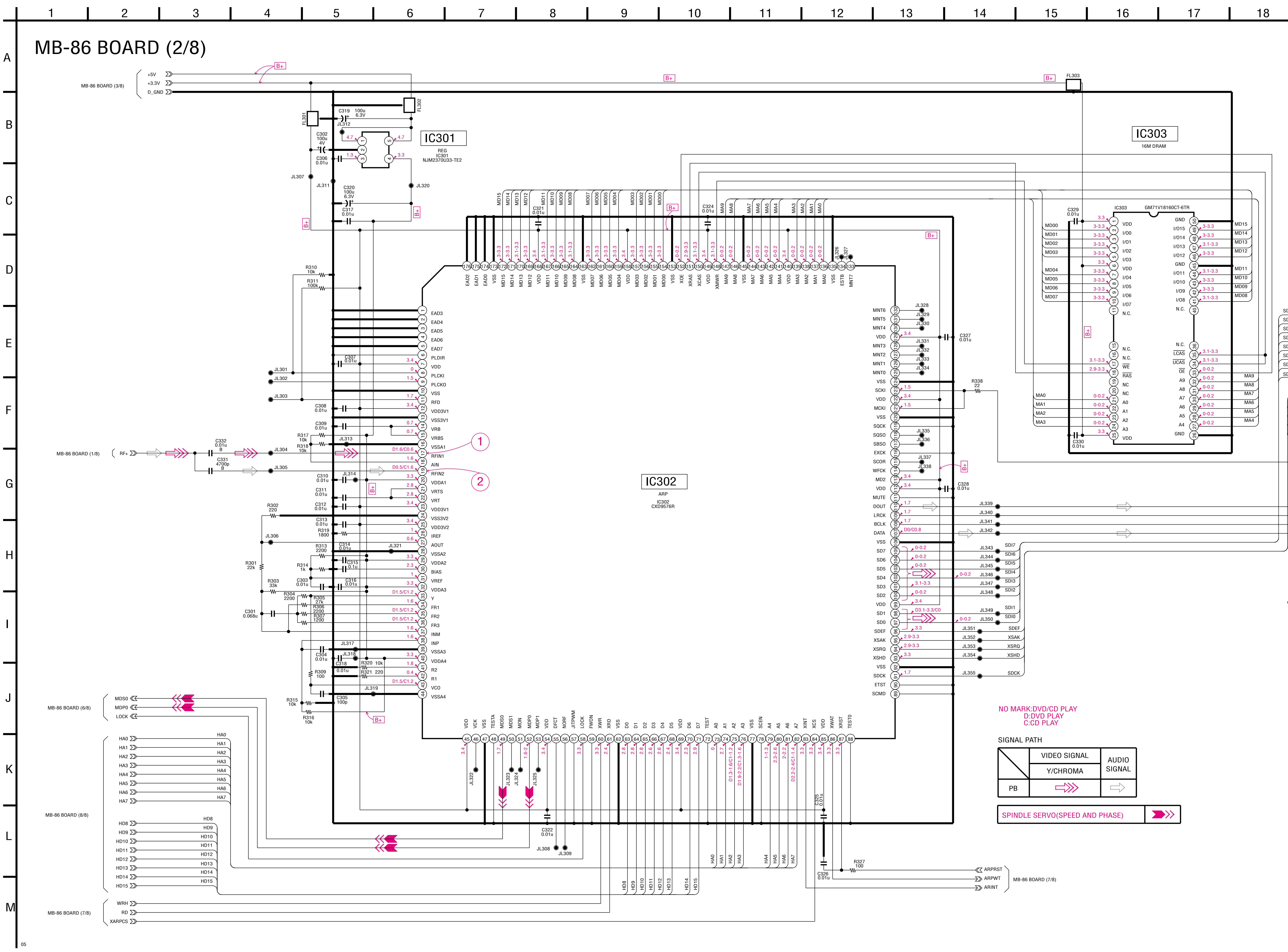
– Ref. No.: MB-86 board; 1,000 series –



The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

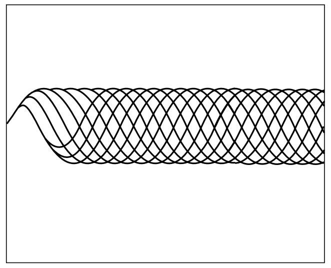
MB-86 (ARP) SCHEMATIC DIAGRAM • **See page 4-7 for printed wiring board.**

– Ref. No.: MB-86 board; 1,000 series –



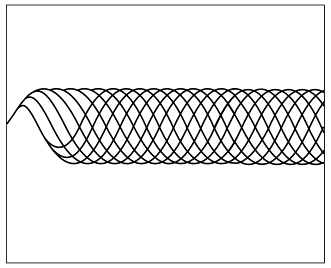
• Waveforms

❶ IC302 ⑰ (DVD play)
500 mV/DIV 100 ns/DIV



1.6 Vp-p

❷ IC302 ⑲ (CD play)
500 mV/DIV 200 ns/DIV

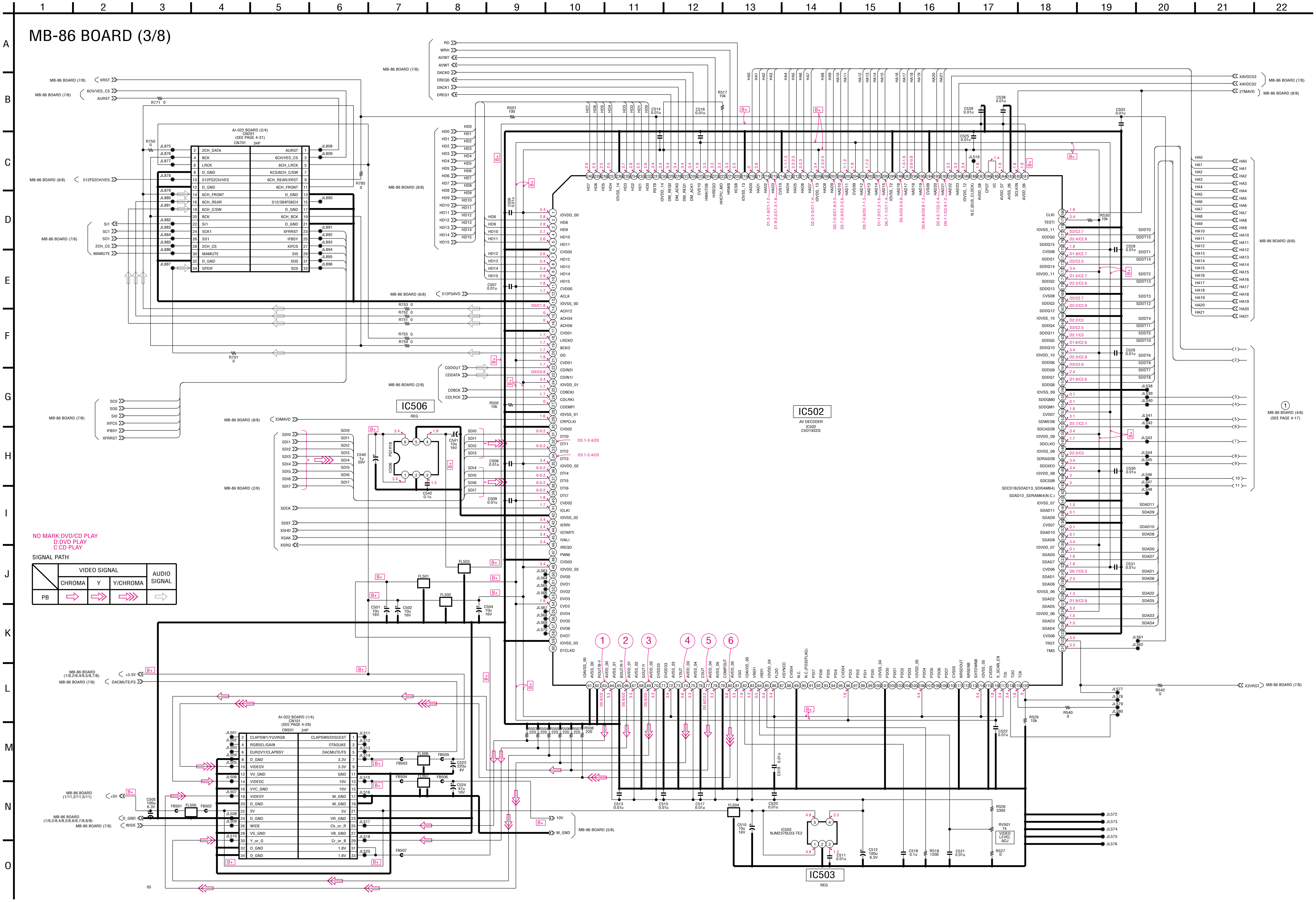


1.6 Vp-p

ARP
MB-86 (2/8)

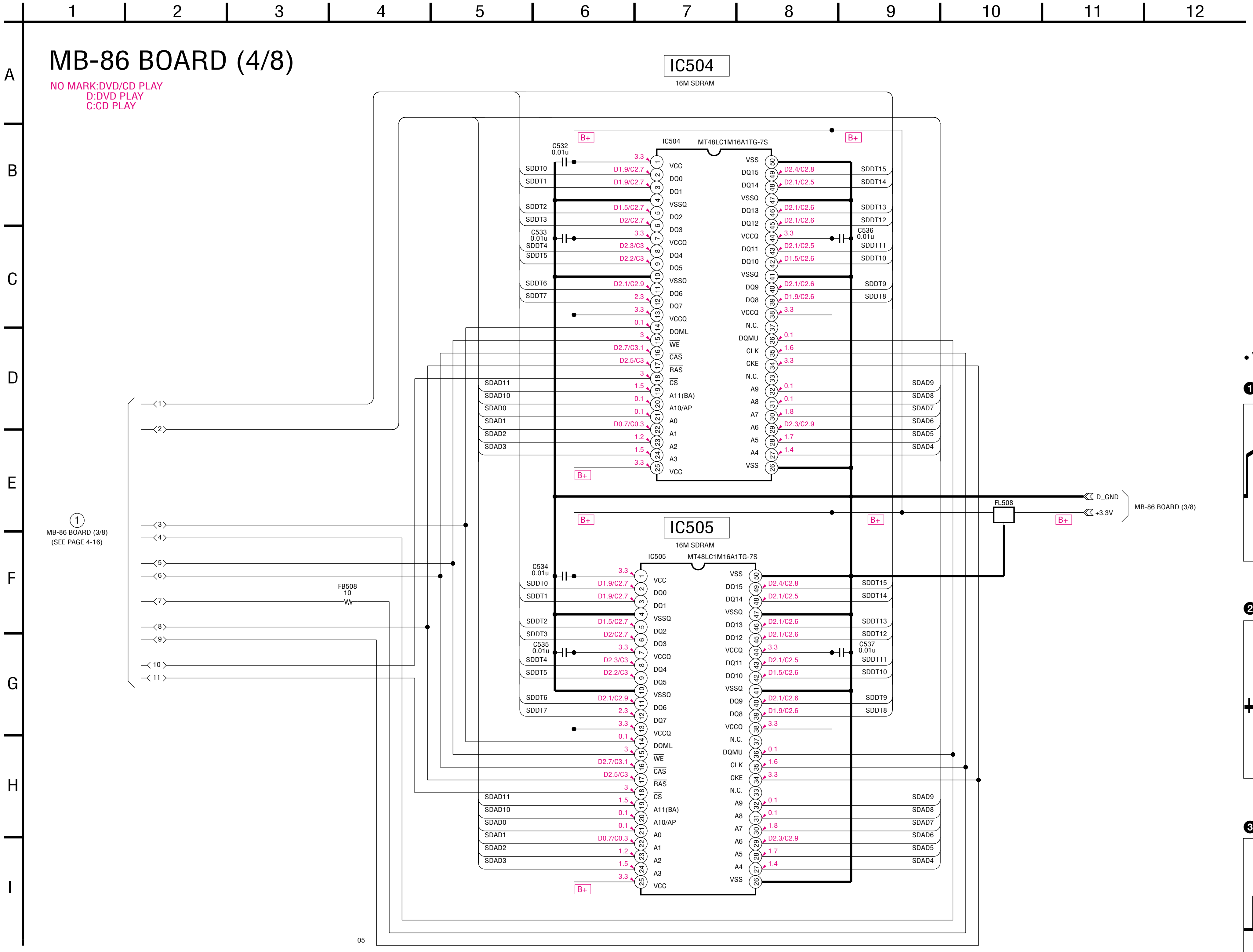
MB-86 (AV DECODER) SCHEMATIC DIAGRAM • See page 4-7 for printed wiring board.

– Ref. No.: MB-86 board; 1,000 series –



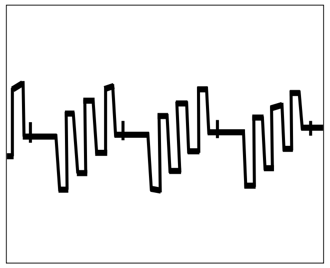
MB-86 (SDRAM) SCHEMATIC DIAGRAM • **See page 4-7 for printed wiring board.**

– Ref. No.: MB-86 board; 1,000 series –



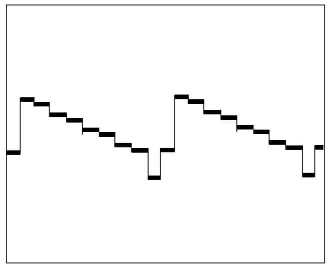
• **Waveforms**

❶ IC502 ㊸



720 mVp-p (H)

❹ IC502 ㊹

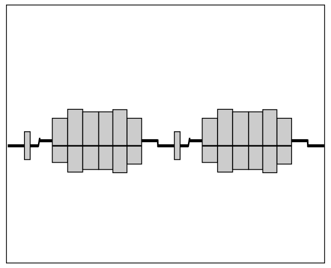


1.1 Vp-p (H)

❷ IC502 ㊻

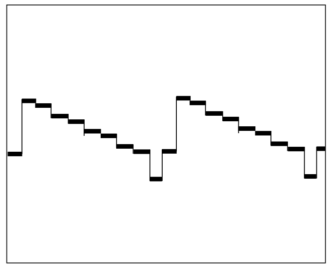
728 mVp-p (H)

❺ IC502 ㊼



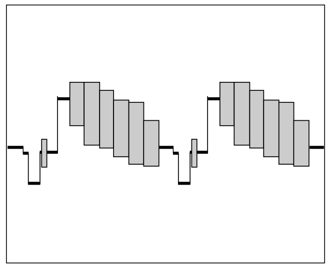
520 mVp-p (H)

❸ IC502 ㊾



1.0 Vp-p (H)

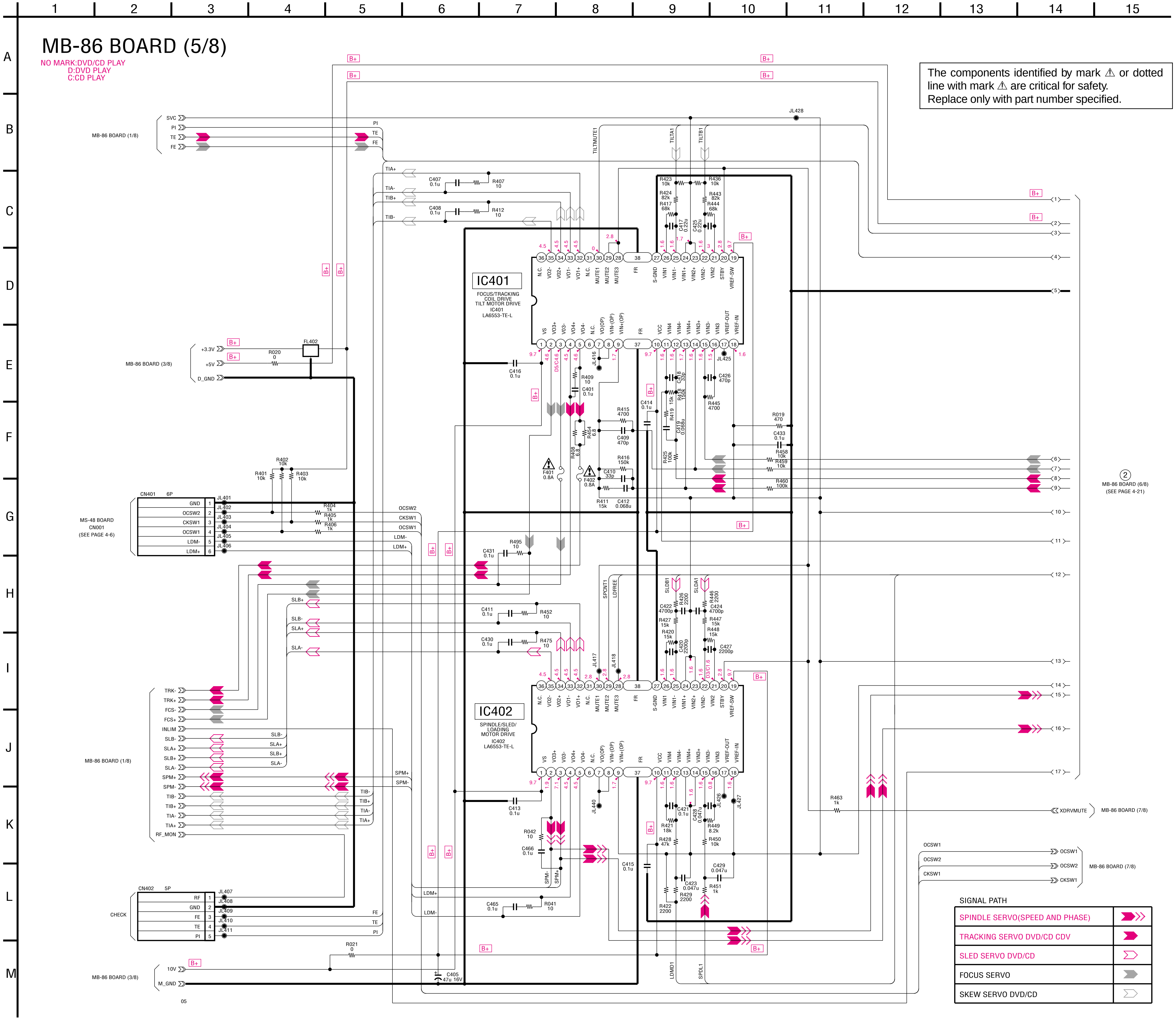
❻ IC502 ㊿



1.2 Vp-p (H)

MB-86 (DRIVE) SCHEMATIC DIAGRAM • See page 4-7 for printed wiring board.

– Ref. No.: MB-86 board; 1,000 series –



The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

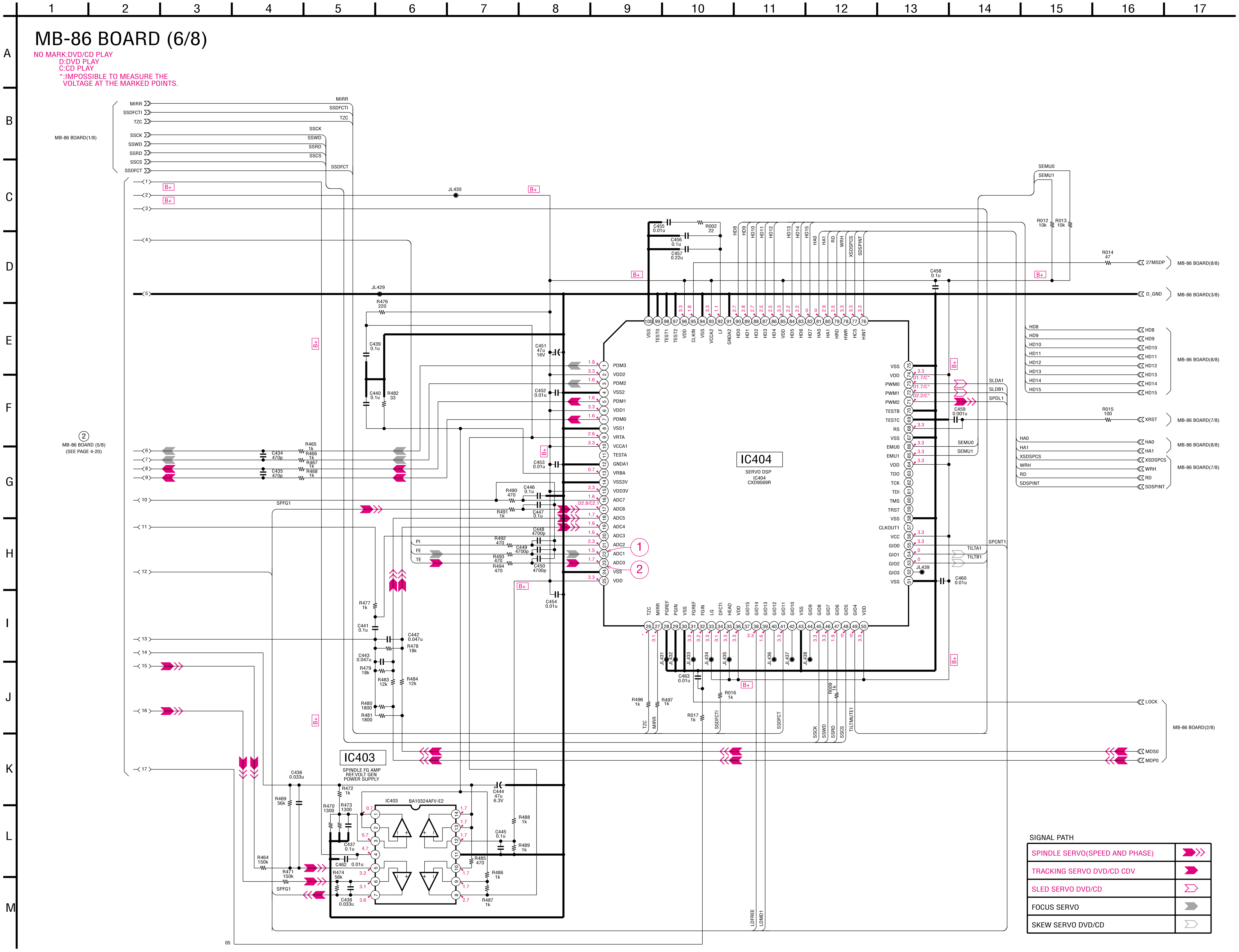
SIGNAL PATH

SPINDLE SERVO(SPEED AND PHASE)	
TRACKING SERVO DVD/CD CDV	
SLED SERVO DVD/CD	
FOCUS SERVO	
SKEW SERVO DVD/CD	

DRIVE
MB-86 (5/8)

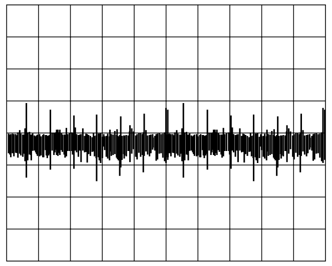
MB-86 (SERVO DSP) SCHEMATIC DIAGRAM • See page 4-7 for printed wiring board.

– Ref. No.: MB-86 board; 1,000 series –



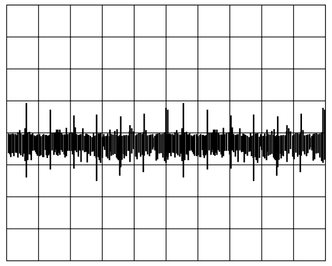
• **Waveforms**

❶ IC404 ㉒ (DVD play)
100 mV/DIV 50 ms/DIV



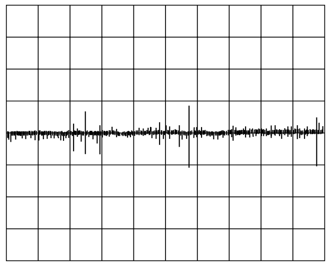
180 mVp-p

❶ IC404 ㉒ (CD play)
500 mV/DIV 50 ms/DIV



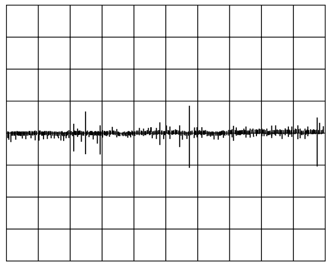
860 mVp-p

❷ IC404 ㉓ (DVD play)
500 mV/DIV 50 ms/DIV



1.4 Vp-p

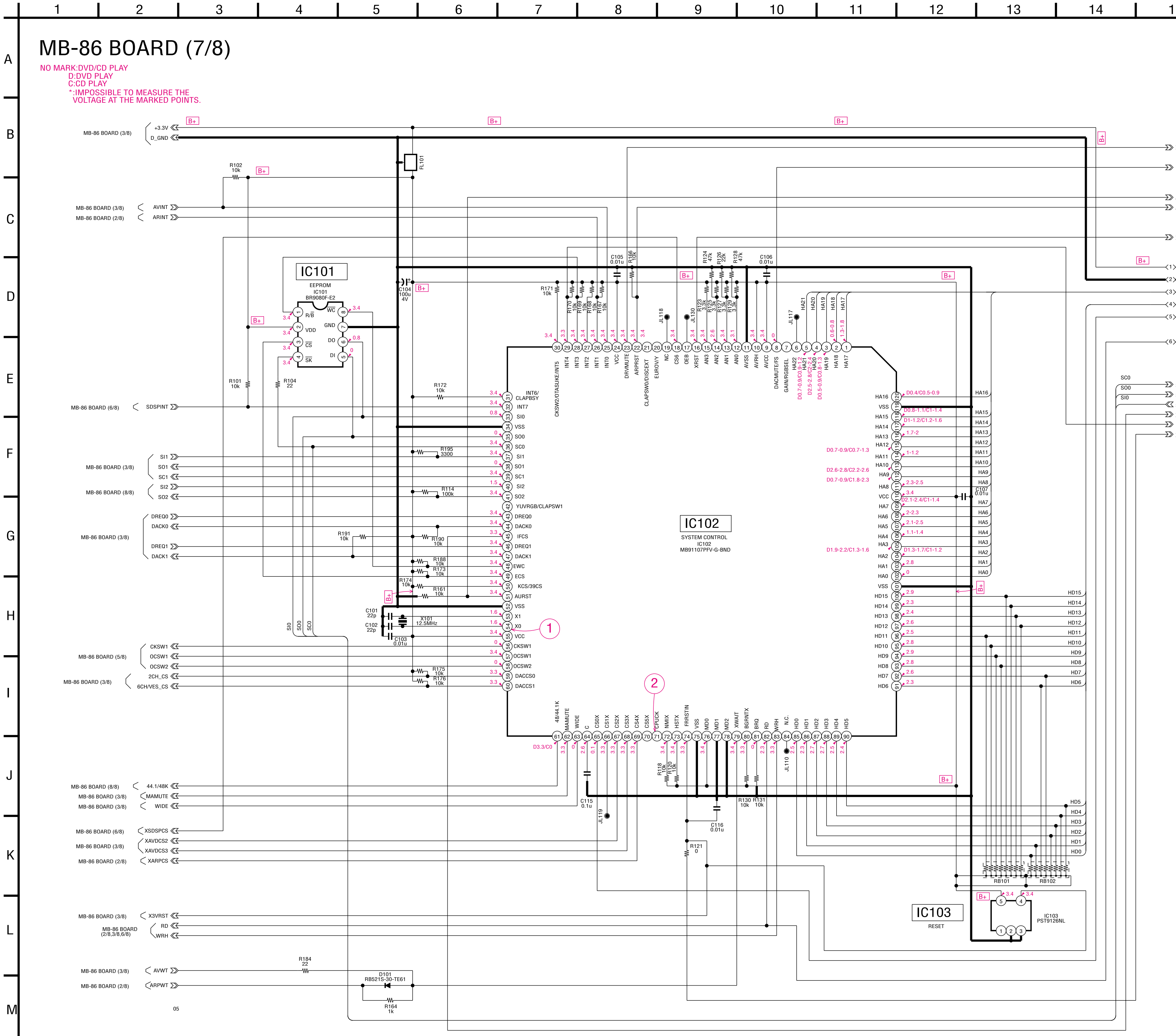
❷ IC404 ㉓ (CD play)
500 mV/DIV 200 mV/DIV



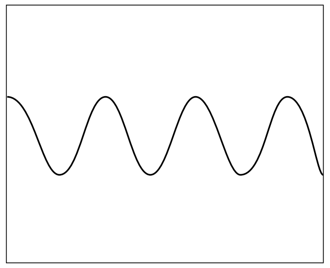
1.7 Vp-p

MB-86 (SYSTEM CONTROL) SCHEMATIC DIAGRAM **• See page 4-7 for printed wiring board.**

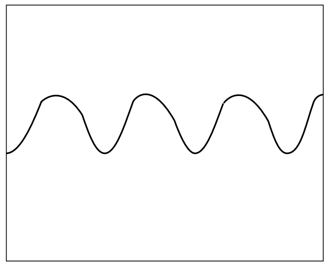
– Ref. No.: MB-86 board; 1,000 series –



• Waveforms



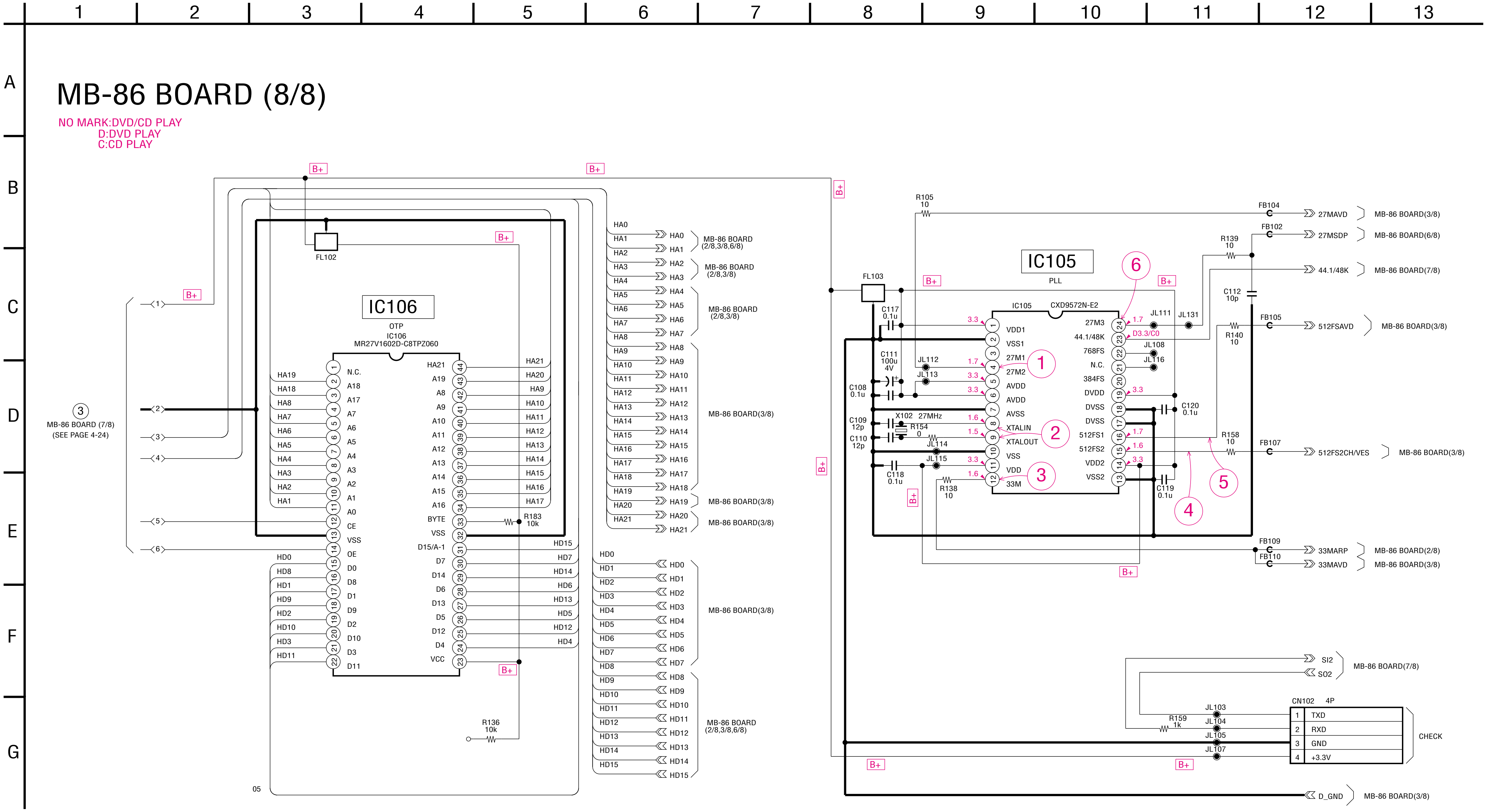
2.4 Vp-p (12.5 MHz)



4 Vp-p (25.3 MHz)

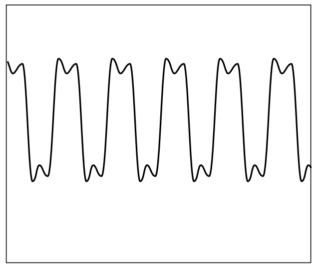
MB-86 (MEMORY, CLOCK GENERATOR) SCHEMATIC DIAGRAM • **See page 4-7 for printed wiring board.**

– Ref. No.: MB-86 board; 1,000 series –



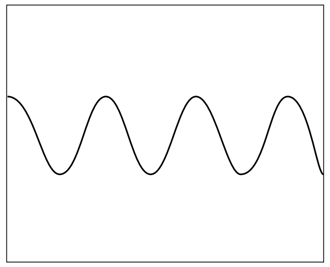
• **Waveforms**

❶ IC105 ④



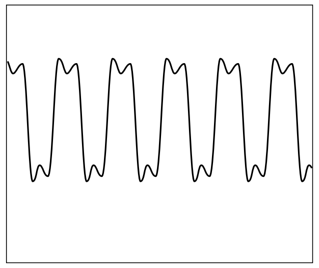
5.2 Vp-p (27 MHz)

❷ IC105 ⑧, ⑨



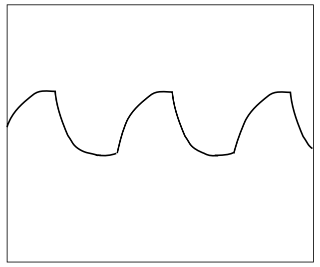
2.5 Vp-p (27 MHz)

❸ IC105 ⑫



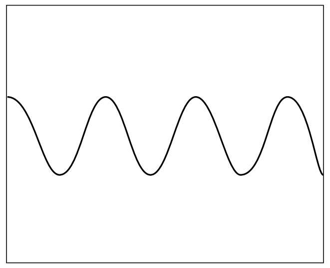
4.9 Vp-p (33.8688 MHz)

❹ IC105 ⑮



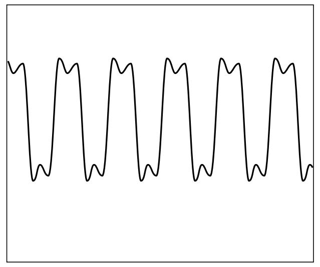
DVD : 3.4 Vp-p (29.5 MHz)
CD : 3.4 Vp-p (22.58 MHz)

❺ IC105 ⑯



DVD : 4.3 Vp-p (29.5 MHz)
CD : 4.3 Vp-p (22.58 MHz)

❻ IC105 ㉔

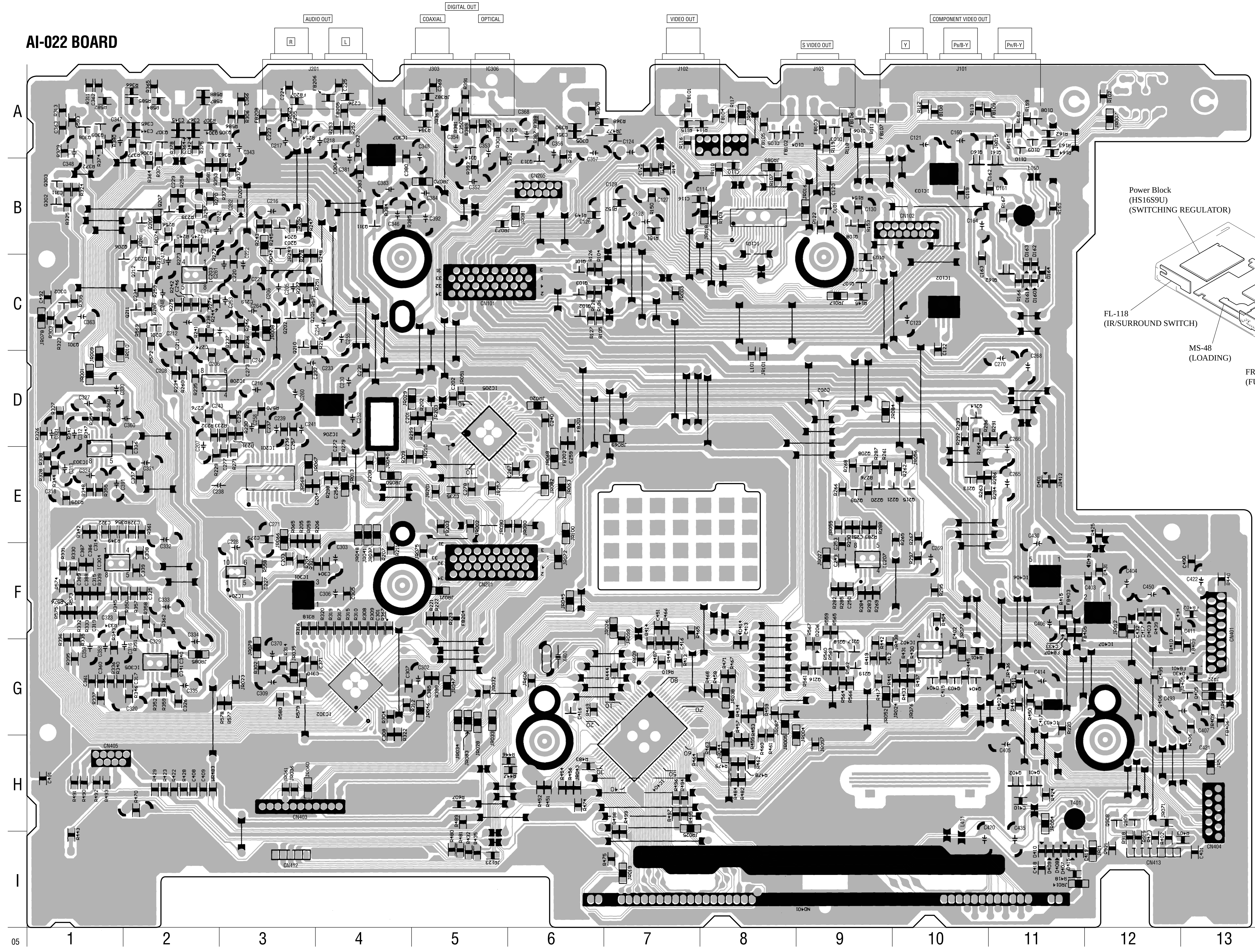


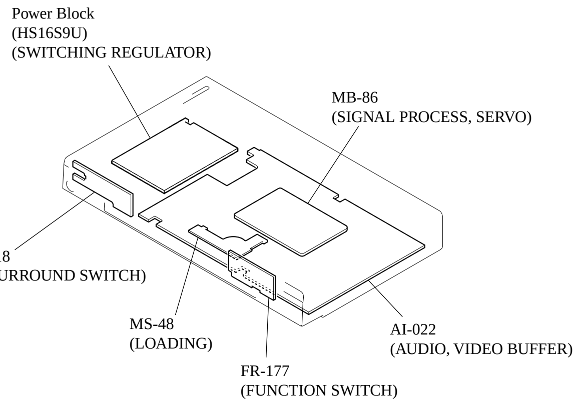
4.9 Vp-p (27.2 MHz)

AI-022 (AUDIO, VIDEO BUFFER) PRINTED WIRING BOARD

– Ref. No.: AI-022 board; 2,000 series –

There are few cases that the part isn't mounted in this model is printed on this diagram.



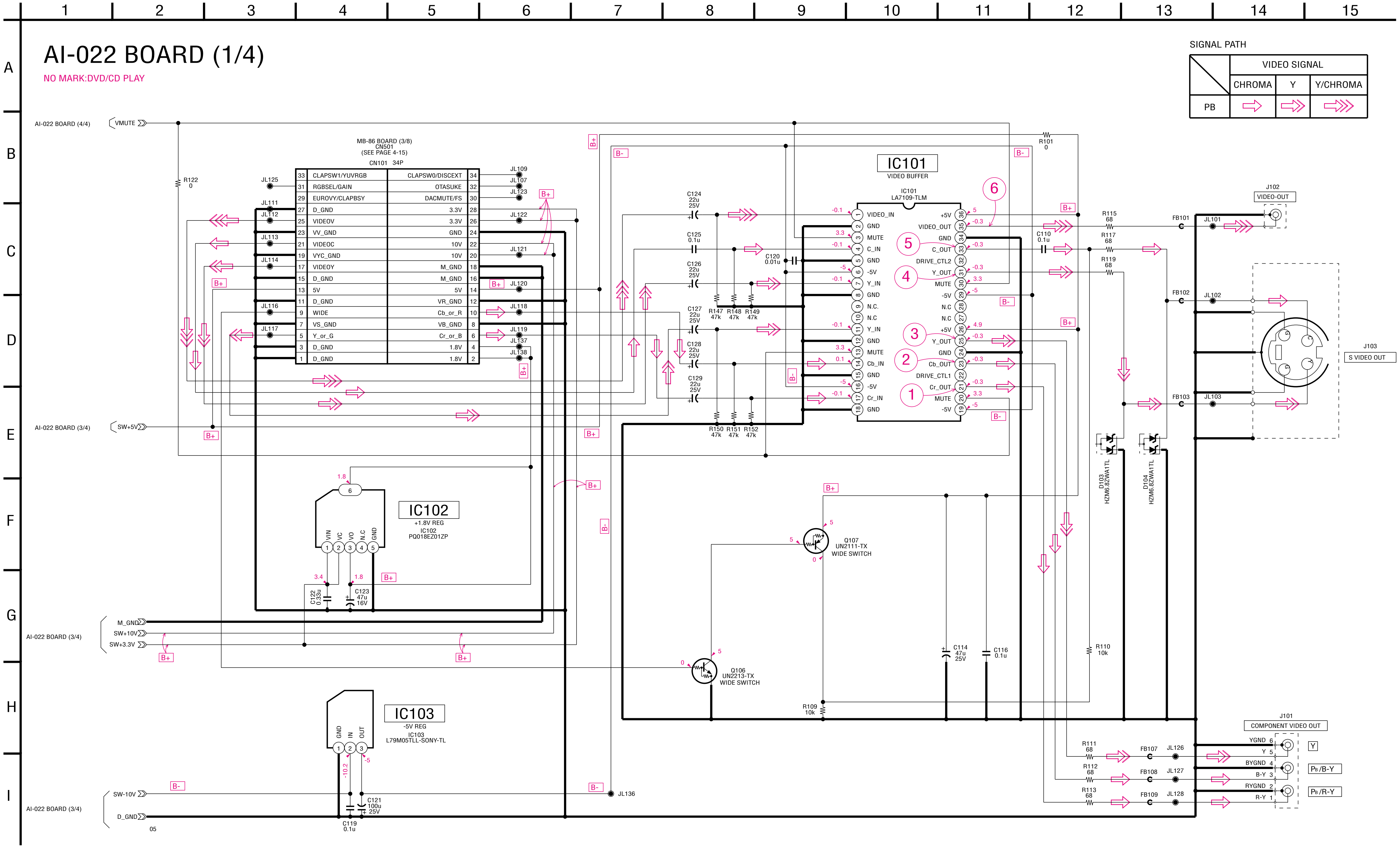


AI-022 BOARD

CN101	C-5
CN201	F-5
CN401	F-13
CN403	H-4
CN405	H-2
CN412	I-3
CN413	I-12
D103	A-9
D104	A-9
D202	D-9
D203	B-2
D205	B-3
D306	A-4
D407	I-11
D408	I-11
D409	I-11
D410	I-11
D411	G-11
D415	I-12
D416	G-6
D417	F-12
D430	G-13
IC101	B-8
IC102	C-10
IC103	B-10
IC201	E-3
IC205	D-5
IC206	D-4
IC208	D-3
IC306	A-5
IC307	A-4
IC403	G-11
IC404	G-7
IC406	F-11
IC407	F-12
Q106	C-9
Q107	C-9
Q203	B-3
Q204	B-3
Q205	B-2
Q206	C-2
Q207	B-2
Q311	B-4
Q313	A-6
Q401	H-11
Q402	H-11
Q908	I-12
Q909	I-12

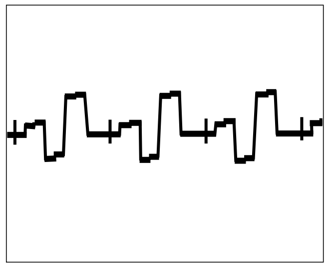
AI-022 (VIDEO BUFFER) SCHEMATIC DIAGRAM

– Ref. No.: AI-022 board; 2,000 series –



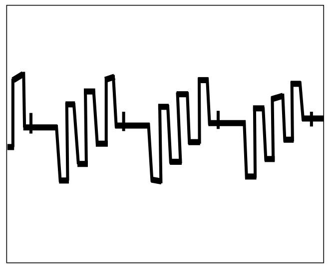
• **Waveforms**

❶ IC101 ㉑



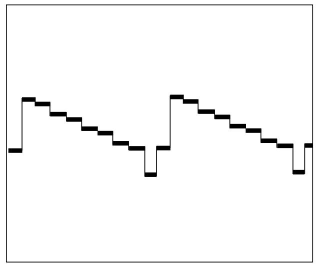
728 mVp-p (H)

❷ IC101 ㉓



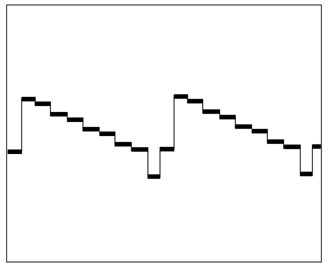
720 mVp-p (H)

❸ IC101 ㉕



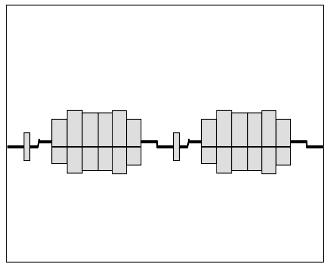
1.0 Vp-p (H)

❹ IC101 ㉛



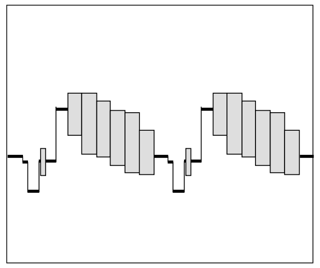
2.1 Vp-p (H)

❺ IC101 ㉝



520 mVp-p (H)

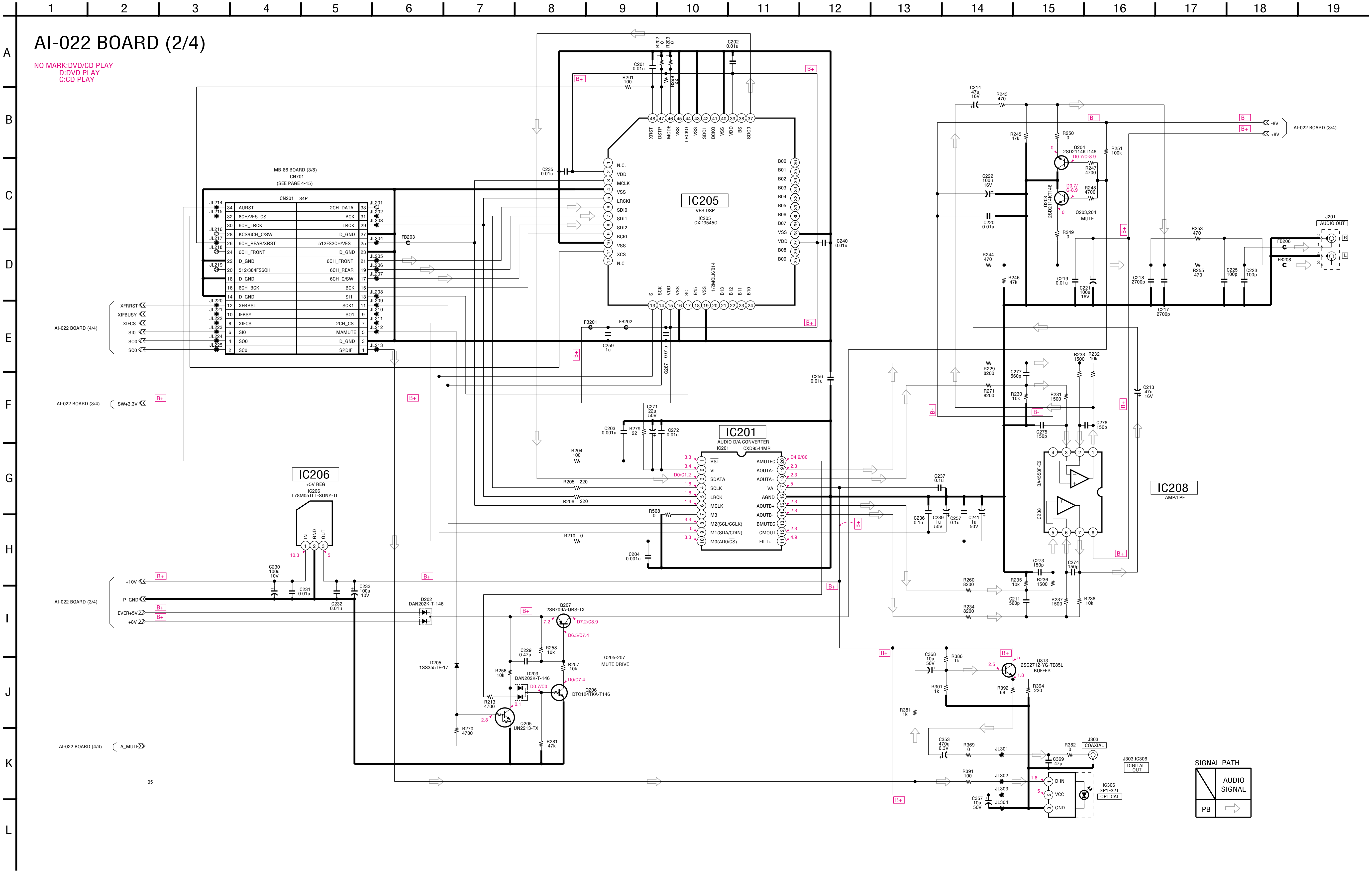
❻ IC101 ㉟



2.4 Vp-p (H)

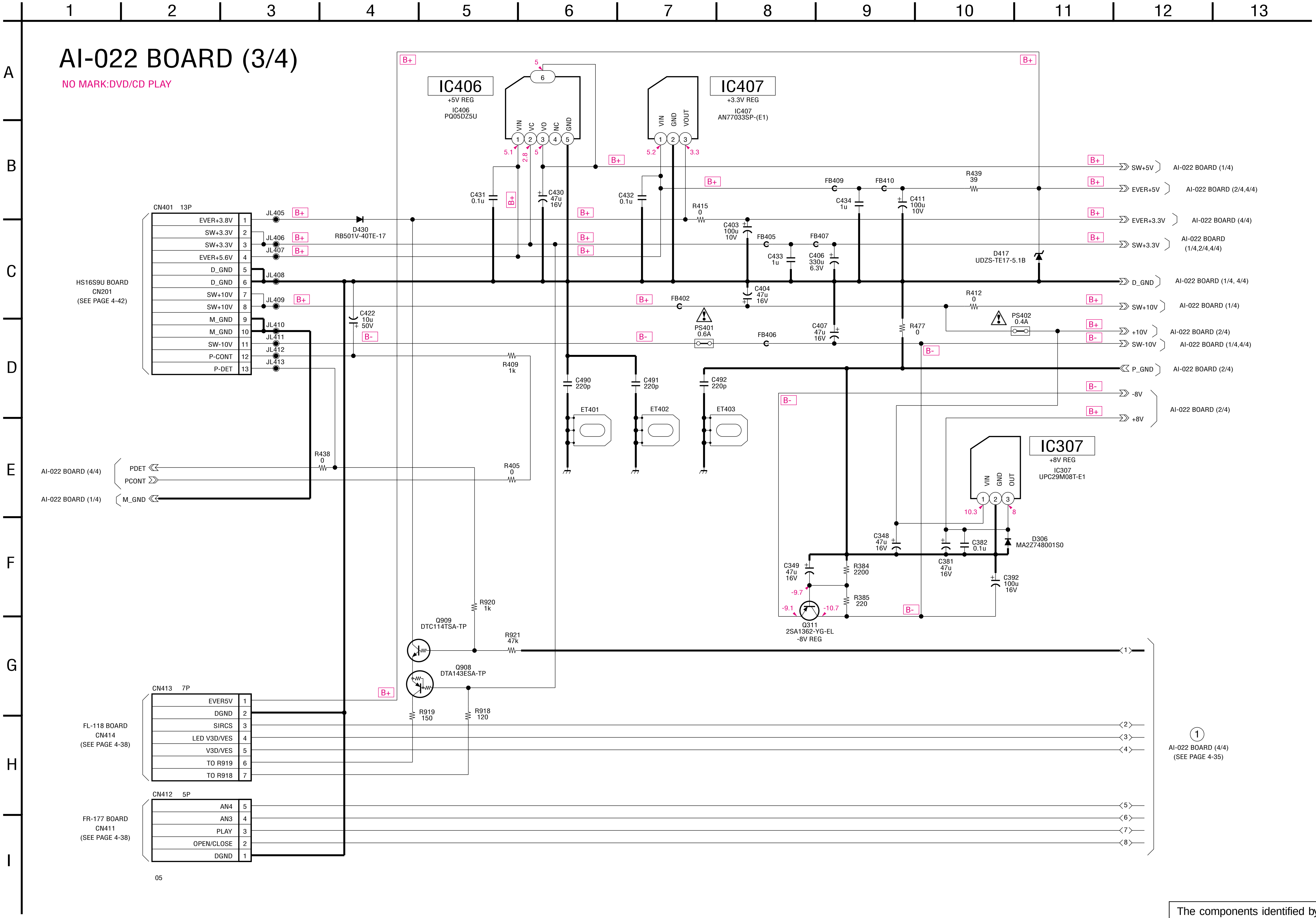
AI-022 (D/A CONVERTER, DSP) SCHEMATIC DIAGRAM • **See page 4-27 for printed wiring board.**

– Ref. No.: AI-022 board; 2,000 series –



D/A CONVERTER, DSP
AI-022 (2/4)

AI-022 (POWER SUPPLY) SCHEMATIC DIAGRAM • **See page 4-27 for printed wiring board.**
– Ref. No.: AI-022 board; 2,000 series –

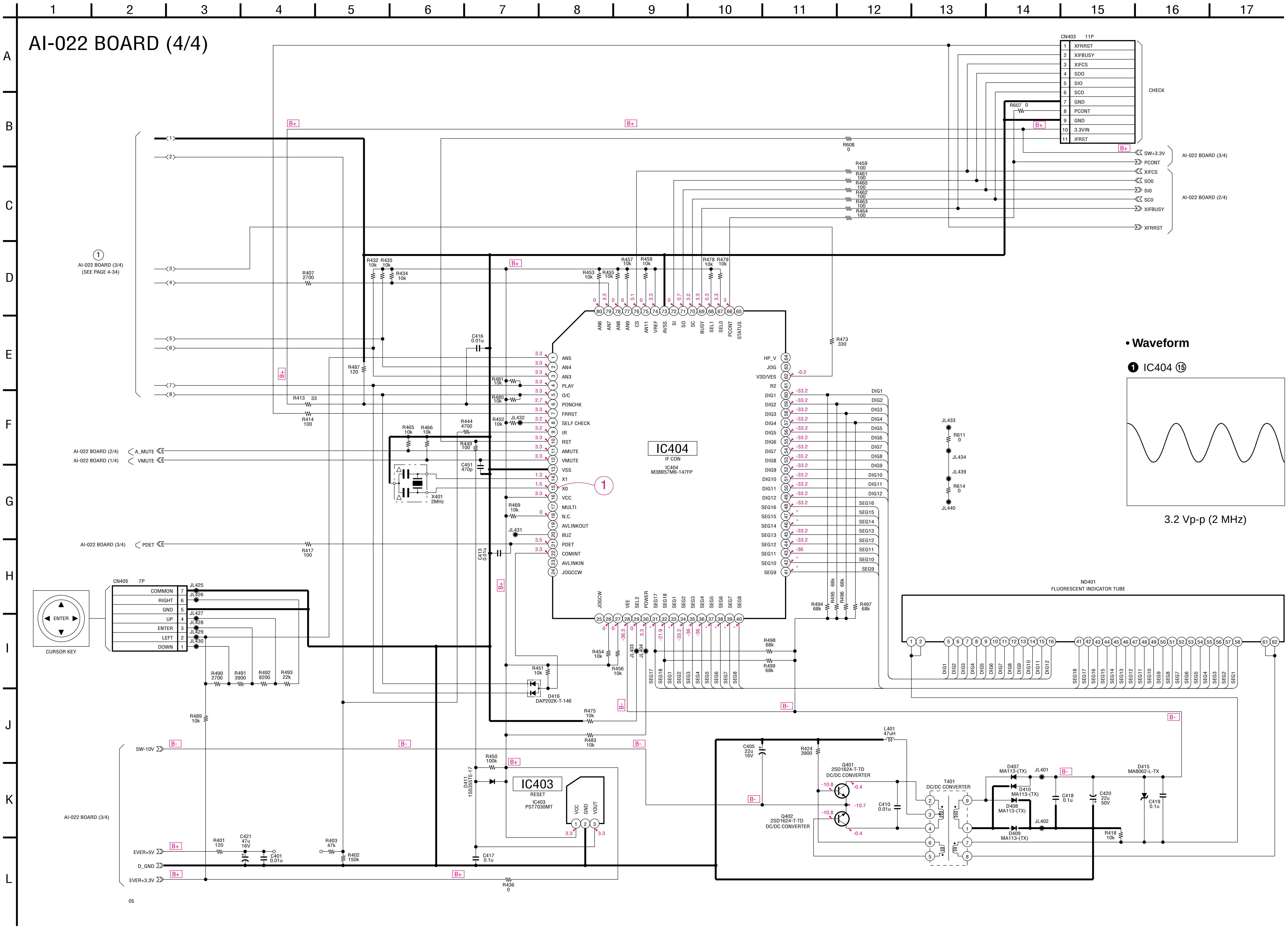


The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

POWER SUPPLY
AI-022 (3/4)

AI-022 (IF CON) SCHEMATIC DIAGRAM • See page 4-27 for printed wiring board.

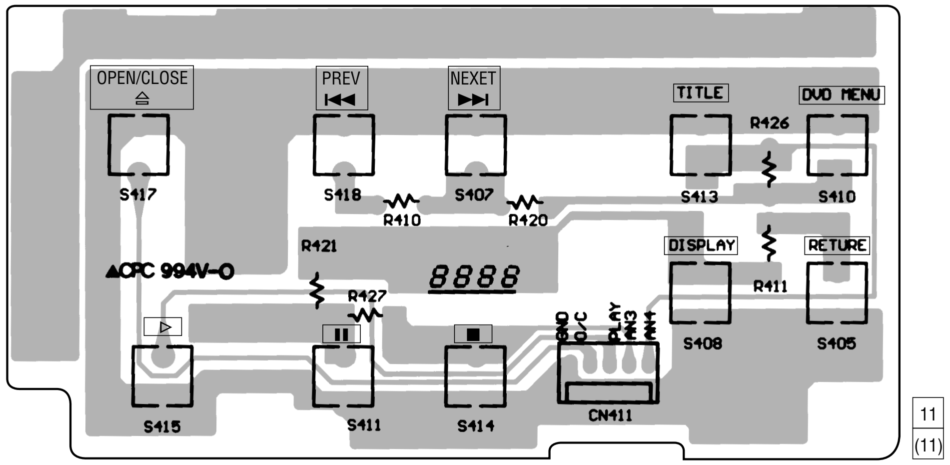
– Ref. No.: AI-022 board; 2,000 series –

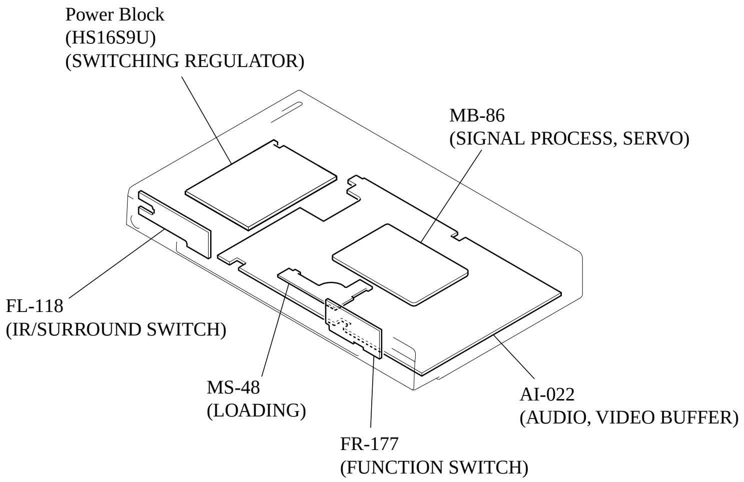


FR-177 (FUNCTION SWITCH), FL-118 (IR/SURROUND SWITCH) PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS
– Ref. No.: FR-177 board, FL-118 board; 3,000 series –

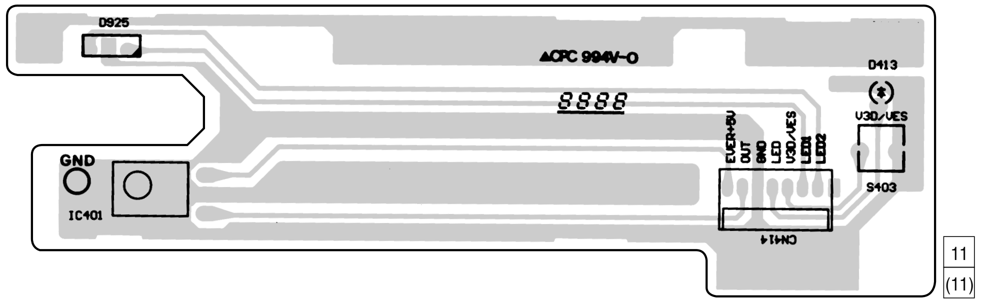
There are few cases that the part isn't mounted in this model is printed on this diagram.

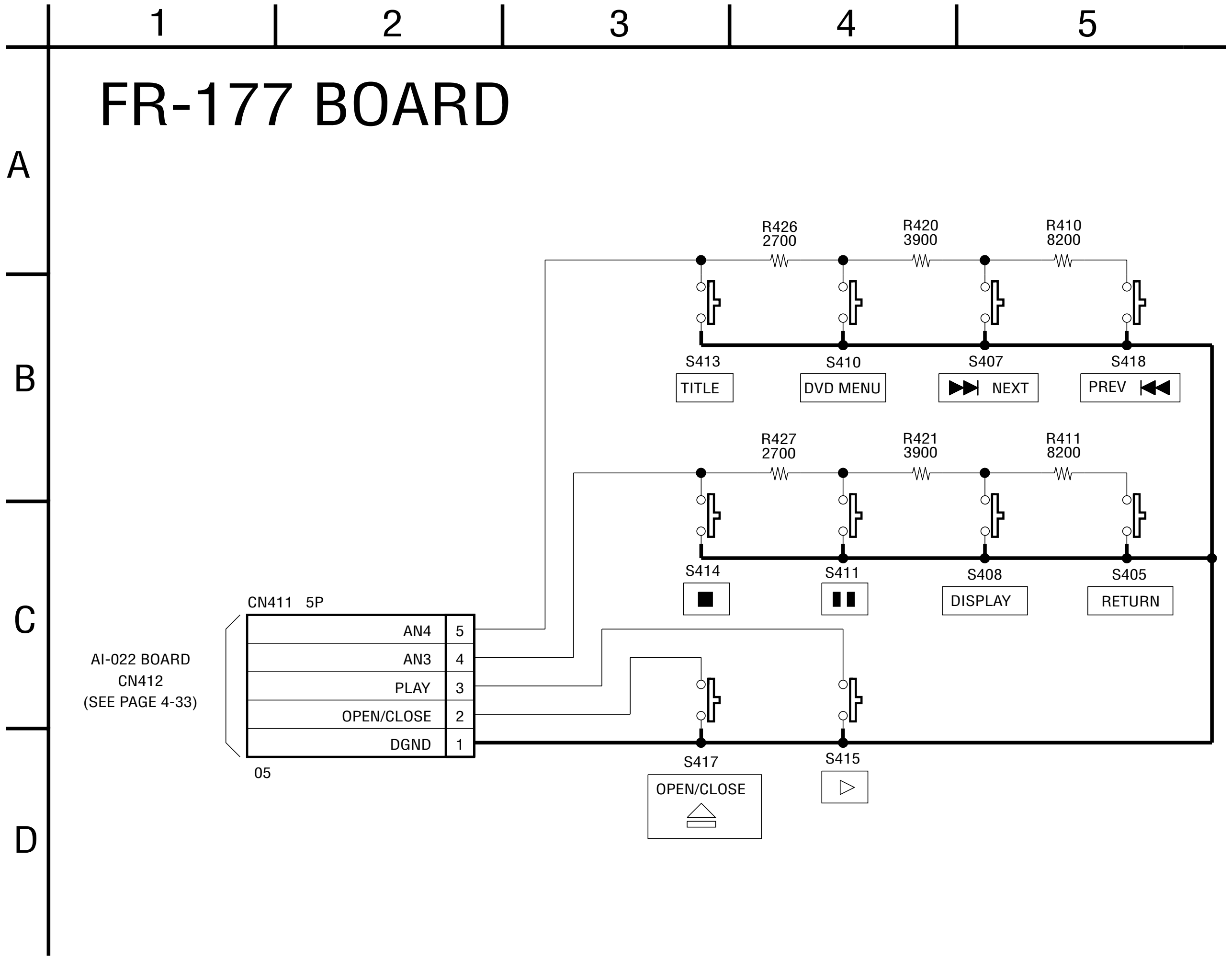
FR-177 BOARD

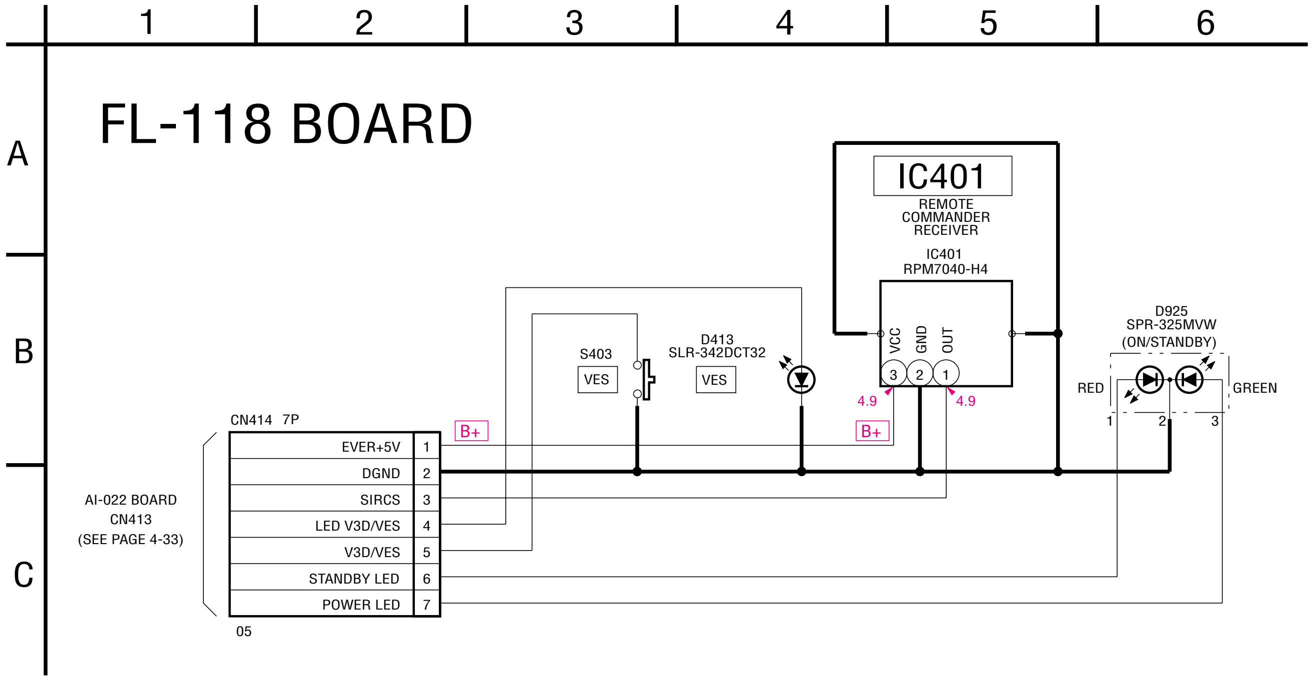




FL-118 BOARD







FUNCTION SWITCH, IR/SURROUND SWITCH
FR-177, FL-118

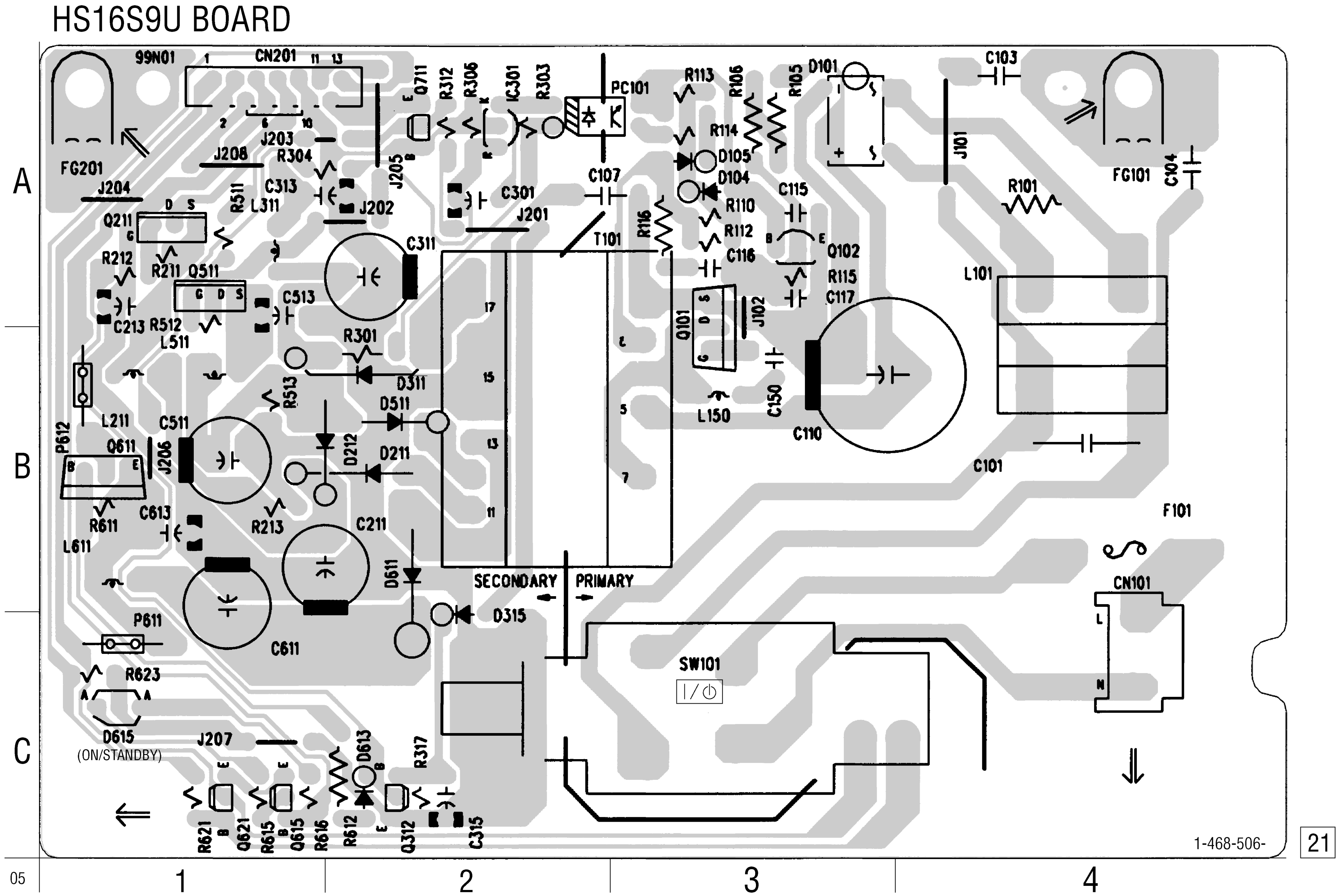
HS16S9U (SWITCHING REGULATOR) PRINTED WIRING BOARD

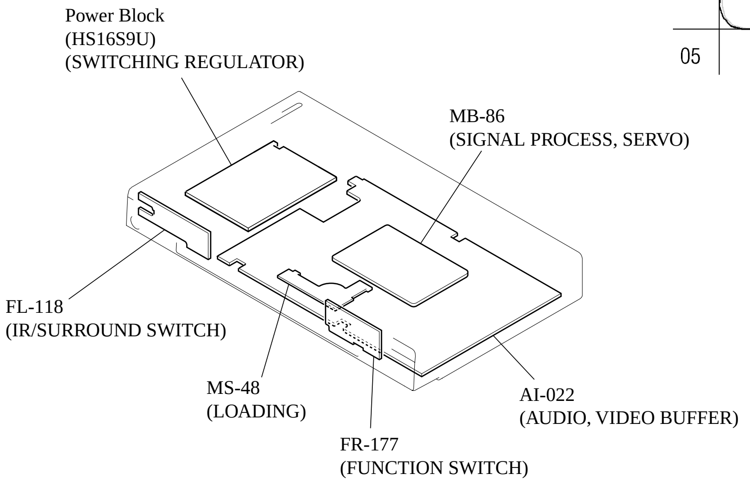
– Ref. No.:HS16S9U board; 5,000 series –

There are few cases that the part isn't mounted in this model is printed on this diagram.

HS16S9U BOARD

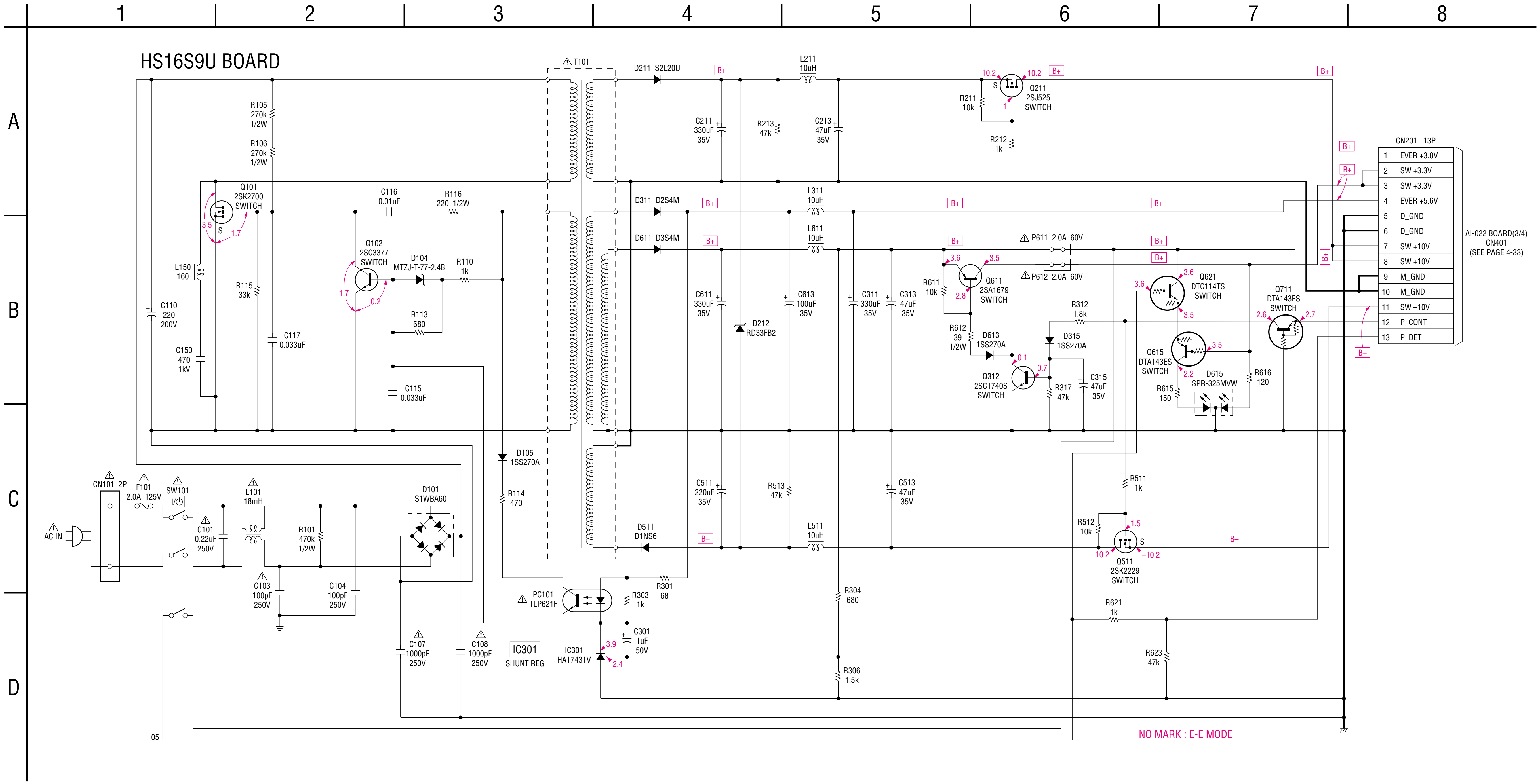
CN101	C-4
CN201	A-1
D101	A-3
D104	A-3
D105	A-3
D211	B-2
D212	B-2
D311	B-2
D315	C-2
D511	B-2
D611	B-2
D613	C-2
D615	C-1
IC301	A-2
Q101	B-3
Q102	A-3
Q211	A-1
Q312	C-2
Q511	A-1
Q611	B-1
Q615	C-1
Q621	C-1
Q711	A-2





HS16S9U (SWITCHING REGULATOR) SCHEMATIC DIAGRAM

– Ref. No.: HS16S9U board; 5,000 series –



The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

SECTION 5
IC PIN FUNCTION DESCRIPTION

5-1. SYSTEM CONTROL PIN FUNCTION (MB-86 BOARD IC102)

Pin No.	Pin name	I/O	Function
1–5	HA17-HA21	O	Address bus A17-A21
6	HA22	–	Not used
7	GAIN/RGBSEL	O	Color difference signal/RGB signal select signal output
8	DACMUTE/FS	O	Filter control signal output
9	AVCC	–	Power supply
10	AVRH	–	Reference power supply (+3.3 V)
11	AVSS	–	Ground
12	AN0	I	Set of mode 0
13	AN1	I	Set of mode 1
14	AN2	I	Set of mode 2
15	AN3	I	Set of mode 3
16	XRST	O	System reset signal output
17	OEB	–	Not used
18	CS6	O	Chip select signal for servo DSP
19	NC	–	Not used
20	EUROV/Y	O	EURO V/Y select signal output
21	CLAPSW0/DISCEXT	O	Line input select signal output (DISC: “H”, EXT: “ L”)
22	ARPRST	O	Reset signal output for ARP
23	DRVMUTE	O	Drive mute signal output
24	VCC	–	Power supply
25	INT0	I	Input of interrupt from AV DEC
26	INT1	I	Input of interrupt from ARP
27	INT2	I	Input of interrupt from FGA
28	INT3	I	Input of interrupt from EEPROM
29	INT4	I	Input of interrupt from IF CON
30	CKSW2/OTASUKE/INT5	I	Input of interrupt from audio DSP
31	CLAPBSY/INT6	I	Input of interrupt from audio DSP
32	INT7	I	Input of interrupt from servo DSP
33	SI0	I	Serial data input from IF CON and EEPROM
34	VSS	–	Ground
35	SO0	O	Serial data output to IF CON and EEPROM
36	SC0	O	Serial clock output to IF CON and EEPROM
37	SI1	I	Serial bus 1 (for data input)
38	SO1	O	Serial bus 1 (for data output)
39	SC1	O	Serial clock output
40	SI2	I	Serial bus 2 (for data input)
41	SO2	O	Serial bus 2 (for data output)
42	YUVRGB/CLAPSW1	O	Mute signal output to video buffer and EURO C/R select signal output
43	DREQ0	I	Input of DMA-REQ 0 from AV DEC
44	DACK0	O	Output of DMA-ACK 0 to AV DEC
45	IFCS	O	Chip select signal to IF CON
46	DREQ1	I	Input of DMA-REQ 1 from AV DEC
47	DACK1	O	Output of DMA-ACK 1 to AV DEC
48	EWC	O	Write control signal output to EEPROM
49	ECS	O	Chip select signal output to EEPROM
50	KCS/39CS	O	Chip select signal output to audio DSP
51	AURST	O	Reset signal output to audio DAC
52	VSS	–	Ground
53	X1	O	Clock output (12.5 MHz)
54	X0	I	Clock input (12.5 MHz)
55	VCC	–	Power supply
56	CKSW1	I	Chuck sensor input
57	OCSW1	I	Tray sensor input
58	OCSW2	I	Tray sensor input
59	DACCS0	O	Chip select signal output to DAC (2ch)
60	DACCS1	O	Chip select signal output to DAC (6ch) and DSP
61	48/44.1K	O	PLL FS control signal output
62	MAMUTE	O	Audio mute signal output
63	WIDE	O	WIDE select signal output
64	C	–	Capacitor (0.1uF) connect between ground
65	CS0X	O	External ROM chip select signal output
66	CS1X	–	Not used
67	CS2X	O	Chip select signal output (for AV DEC)
68	CS3X	O	Chip select signal output (for AV DEC)
69	CS4X	O	Chip select signal output (for ARP)
70	CS5X	O	Chip select signal output (for FGA)

Pin No.	Pin name	I/O	Function
71	CPUCK	O	CPU clock signal output
72	NMIX	–	Not used (fixed at “H”)
73	HSTX	–	Not used (fixed at “H”)
74	FRRSTIN	I	Reset signal input from IF CON
75	VSS	–	Ground
76	MD0	I	Input of mode select 0 (fixed at “1”)
77	MD1	–	Ground
78	MD2	–	Ground
79	XWAIT	I	Wait signal input
80	BGRNTX	–	Test terminal (fixed at “H”)
81	BRQ	–	Test terminal (fixed at “L”)
82	RD	O	Read enable signal output
83	WRH	O	High byte write enable signal output (16 bit and 8 bit)
84	NC	–	Not used
85–92	HD0-HD7	I/O	Data bus D0-D7 (16 bit only)
93–100	HD8-HD15	I/O	Data bus D8-D15 (16 bit) , D0-D7 (8 bit)
101	VSS	–	Ground
102–109	HA0-HA7	O	Address bus A00-A07
110	VCC	–	Power supply
111–118	HA8-HA15	O	Address bus A08-A15
119	VSS	–	Ground
120	HA16	O	Address bus A16

SECTION 6
TEST MODE

6-1. GENERAL DESCRIPTION

The Test Mode allows you to make diagnosis and adjustment easily using the remote commander and monitor TV. The instructions, diagnostic results, etc. are given on the on-screen display (OSD).

6-2. STARTING TEST MODE

Press [TITLE], [CLEAR], [POWER] buttons on the remote commander in this order with the power of main unit in OFF status, and the Test Mode starts, then the menu shown below will be displayed on the TV screen. At the bottom of menu screen, the model name and revision number are displayed.
To execute each function, select the desired menu and press its number on the remote commander.
To exit from the Test Mode, press the POWER button.

```
         Test Mode Menu

0. Syscon Diagnosis
1. Drive Auto Adjustment
2. Drive Manual Operation
3. Mecha Aging
4. Emergency History
5. Version Information
6. Video Level Adjustment
                Exit: Power Key
_
Model    : DPX13xxxx
Revision  : 1.xxxx
```

6-3. SYSCON DIAGNOSIS

The same contents as board detail check by serial interface can be checked from the remote commander.
On the Test Mode Menu screen, press [0] key on the remote commander, and the following check menu will be displayed.

```
    ### Syscon Diagnosis ###
          Check Menu
0. Quit
1. All
2. Version
3. Peripheral
4. Servo
5. Supply
6. AV Decoder
7. Video
8. Audio
_
```

0. Quit

Quit the Syscon Diagnosis and return to the Test Mode Menu.

1. All

All items continuous check
This menu checks all diagnostic items continuously. Normally, all items are checked successively one after another automatically unless an error is found, but at a certain item that requires judgment through a visual check to the result, the following screen is displayed for the key entry.

```
    ### Syscon Diagnosis ###

        Diag All Check
        No. 2 Version

 2-3. ROM Check Sum
Check Sum = xxxx



Press NEXT Key to Continue
Press PREV Key to Repeat
_
```

For the ROM Check, the check sum calculated by the Syscon is output, and therefore you must compare it with the specified value for confirmation.
Following the message, press [NEXT] key to go to the next item, or [PREV] key to repeat the same check again. To quit the diagnosis and return to the Check Menu screen, press [STOP] or [ENTER] key. If an error occurred, the diagnosis is suspended and the error code is displayed as shown below.

```
    ### Syscon Diagnosis ###



 3-2. EEPROM Check
Error 03: EEPROM Write/Reed N
Address    : 00000001
Write Data : 2492
Read Data  : 2490
Press NEXT Key to Continue
Press PREV Key to Repeat
_
```

Press [STOP] key to quit the diagnosis, or [PREV] key to repeat the same item where an error occurred, or [NEXT] key to continue the check from the item next to faulty item.

Subnemu

Selecting 2 and subsequent items calls the submenu screen of each item.
For example, if “5. Supply” is selected, the following submenu will be displayed.

```
    ### Syscon Diagnosis ###
          Check Menu
          No. 5 Supply
0. Quit
1. All
2. ARP Register Check
3. ARP to RAM Data Bus
4. ARP to RAM Address Bus
5. ARP RAM Check
_
```

0. Quit

Quit the submenu and return to the main menu.

1. All

All submenu items continuous check

This menu checks 2 and subsequent items successively. At the item where visual check is required for judgment or an error occurred, the checking is suspended and the message is output for key entry. Normally, all items are checked successively one after another automatically unless an error is found.

Selecting 2 and subsequent items executes respective menus and outputs the results.

For the contents of each submenu, see “Check Items List”.

General Description of Checking Method

2. Version

(2-2) Revision
ROM revision number is displayed.
Error: Not detected.
The revision number defined in the source file of ROM (IC106) is displayed with four digits.

(2-3) ROM Check Sum
Check sum is calculated.
Error: Not detected.
The data are added of ROM (IC106) and the result is displayed with 4-digit hexadecimal number. Error is not detected. Compare the result with the specified value.

(2-4) Model Type
Model code is displayed.
Error: Not detected.
The model code is displayed with 2-digit hexadecimal number.

	Model Type	
DVP-S350 (US)	0	0

(2-5) Region
Region code is displayed.
Error: Not detected.
The region code determined from the model code is displayed.

3. Peripheral

(3-2) EEPROM Check
Data write → read, and accord check
Error 03: EEPROM write/read discord
Before writing, the data are saved, then after checking, they are written to restore the contents of EEPROM.

(3-3) Gate Array Check
Data write → read, and accord check
Error 02: Gate array write/read discord

4. Servo

(4-2) Servo DSP Check
Data write → read, and accord check
Error 12: Read data discord

(4-3) DSP Driver Test
Test signal data → DSP Driver
Error: Not detected.

5. Supply

Caution: Do not conduct this check with a mechanical deck connected.
An access is made to the stream supply and servo control IC (IC302) and external RAM (IC303) using check data. If mechanical deck is connected, the motor and optics could be damaged. This check is also executed by the “All” menu item.

Supplement: How to disconnect mechanical deck
Disconnect flexible flat cables connected to the CN201 and CN202 of MB-86 board. Also, disconnect flat cable from the CN401.

(5-2) ARP Register Check
Data write → read, and accord check
Error 08: ARP register write, and read data discord

(5-3) ARP to RAM Data Bus
Data write → read, and accord check
Error 09: ARP ←→ RAM data bus error
Data 0x0001 to 0x8000 where one bit each is set to 1 are written to the address 0 of RAM (IC303) connected to the ARP (IC302) through the bus, then they are read and checked. In case of discord, written bit pattern and read data are displayed. If data where multiple bits are 1 are read, the bits concerned may touch each other. Further, if data where certain bit is always 1 or 0 regardless of written data, the line could be disconnected or shorted.

(5-4) ARP to RAM Address Bus
Data write → other address read discord check
Error 10: ARP → RAM address bus error
Caution: Address and data display in case of an error is different from the display of other diagnosis (described later).
Before starting the test, all addresses of RAM (IC303) are cleared to 0x0000.
First, 0xA55A is written to the address 0x00000, and the address data are read and checked from addresses 0x00001 to 0x80000 while shifting 1 bit each. Next, the data at that address is cleared, and it is written to the address 0x00001, and read and checked in the same manner. This check is repeated up to the address 0x80000 while shifting the address data by 1 bit each.
If data other than 0 is read at the addresses except written address, an error is given because all addresses were already cleared to 0. In this check, the error display pattern is different from that of other diagnosis; read data, written address, and read address are displayed in this order. However, the message uses same template, and accordingly exchange Address and Data when reading. The following display, for example,

```
    ### Syscon Diagnosis ###



 5-4. ARP to RAM Address Bus
Error 10: ARP - RAM Address B
Address    : 0000A55A
Write Data : 00000000
Read Data  : 00080000
Press NEXT Key to Continue
Press PREV Key to Repeat
_
```

shows the data 0xA55A was read from address 0x00080000 though it was written to the address 0x00000000. This implies that these addresses are in the form of shadow. Also, if the read data is not 0xA55A, another error will be present.

(5-5) ARP RAM Check
Data write → read, and accord check
Error 11: ARP RAM read data discord
The program code data stored in ROM are copied to all areas of RAM (IC303) connected to the ARP (IC302) through the bus, then they are read and checked if they accord. If the detail check was selected initially, the data are written to all areas and read, then the same test is conducted once again with the data where all bits are inverted between 1 and 0. If discord is detected, faulty address, written data, and read data are displayed following the error code 11, and the test is suspended.

6. AV Decoder

(6-2) 1930 RAM
Data write → read, and accord check
Error 13: AVD RAM read data discord
The program code data stored in ROM (IC106) are copied to all areas of RAM (IC504, IC505) connected to the AVD (IC502) through the bus, then they are read and checked if they accord. Further, the same test is conducted once again with the data where all bits are inverted between 1 and 0. If discord is detected, faulty address, written data, and read data are displayed following the error code 13, and the test is suspended.

(6-3) 1930 SP
ROM → AVD RAM → Video OUT
Error: Not detected.
The data including sub picture streams in ROM (IC106) are transferred to the RAM (IC504, IC505) in AVD (IC502), and output as video signals from the AVD (IC502).
They are output from all video terminals (Composite, Y/C, Component).

7. Video

(7-2) Color Bar
AVD color bar command write → Video OUT
Error: Not detected.
The command is transferred to the AVD, and the color bar signals are output from video terminals.
They are output from all video terminals (Composite, Y/C, Component).

8. Audio

(8-2) ARP → 1930
Error 14 : ARP → 1930 video NG
15 : ARP → 1930 audio NG

(8-3) Test Tone
A pink noise signal is output from the AVD (IC502) through optical coaxial digital terminal and analog audio terminal.
Error: Not detected.
All channels → 2ch Left → 2ch Right are checked in this order.

Check Items List

2) Version
(2-2) Revision
(2-3) ROM Check Sum
(2-4) Model Type
(2-5) Region

3) Peripheral
(3-2) EEPROM Check
(3-3) Gate Array Check

4) Servo
(4-2) Servo DSP Check
(4-3) DSP Driver Test

5) Supply
(5-2) ARP Register Check
(5-3) ARP to RAM Data Bus
(5-4) ARP to RAM Address Bus
(5-5) ARP RAM Check

6) AV Decoder
(6-2) 1930 RAM
(6-3) 1930 SP

7) Video
(7-2) Color Bar

8) Audio
(8-2) ARP → 1930
(8-3) Test Tone

Error Codes List
00: Error not detected
01: RAM write/read data discord
02: Gate array NG
03: EEPROM NG
08: ARP register read data discord
09: ARP ←→ RAM data bus error
10: ARP ←→ RAM address bus error
11: ARP RAM read data discord
12: Servo DSP NG
13: 1930 SDRAM NG
14: ARP → 1930 video NG
15: ARP → 1930 audio NG
16: 1939 UCODE download NG
17: System call error (function not supported)
18: System call error (parameter error)
19: System call error (illegal ID number)
20: System call error (time out)
90: Error occurred
91: User verification NG
92: Diagnosis cancelled

6-4. DRIVE AUTO ADJUSTMENT

On the Test Mode Menu screen, press [1] key on the remote commander, and the drive auto adjustment menu will be displayed.

```
   ## Drive Auto Adjustment ##

         Adjustment Menu

0. ALL
1. DVD-SL
2. CD
3. DVD-DL
4. SACD



                  Exit: RETURN
```

Normally, [0] is selected to adjust DVD (single layer), CD, DVD (dual layer), and SACD in this order. But, individual items can be adjusted for the case where adjustment is suspended due to an error. In this mode, the adjustment can be made easily through the operation following the message displayed on the screen.
The disc used for adjustment must be the one specified for adjustment. However, for SACD disc, use the player with initial data if the disc is not available.

0. ALL

You will be asked if EEPROM data are initialized or not, and for this prompt, select [0] and press the [ENTER] key, and the servo set data in EEPROM will be initialized. Then, 1. DVD-SL disc, 2. CD disc, 3. DVD-DL disc, and 4. SACD disc are adjusted in this order. Each time one disc was adjusted, it is ejected. Replace it with the specified disc following the message. Though the message to confirm whether discs other than SACD disc are adjusted is not displayed, you can finish the adjustment if pressing the [STOP] button. The S curve level, RF level, and jitter value can be confirmed during adjustment, and if OK, press the [ENTER] key and continue adjustment. (If NG, press the [STOP] button) During adjustment of each disc, the measurement for disc type judgment is made. As automatic adjustment does not judge the disc type unlike conventional models, take care not to insert wrong type discs. Also, do not give a shock during adjustment.

1. DVD-SL (single layer)

Select [1], insert DVD single layer disc, and press [ENTER] key, and the adjustment will be made through the following steps, then adjusted values will be written to the EEPROM.

DVD Single Layer Disc Adjustment Steps

1. SLED TILT Reset
2. Disc Check Memory SL
3. Wait 500 msec
4. Set Disc Type SL
5. LD ON
6. Spdl Start
7. Wait 1 sec
8. Focus Search ON
9. Focus Search OFF
10. Focus Servo ON 1
11. Auto Track Offset Adjust
12. Tracking ON
13. CLVA ON
14. Wait 1 sec
15. Sled ON
16. Check CLV Lock
17. Auto LFO Adjust
18. Auto Focus Offset Adjust
19. Auto Tilt Position Adjust
20. Auto Focus Gain Adjust
21. Auto Focus Offset Adjust
22. EQ Boost Adjust
23. Auto LFO Adjust
24. Auto Track Gain Adjust
25. All Servo Stop
26. Eep Copy Loop Filter Offset

2. CD

Select [2], insert CD disc, and press [ENTER] key, and the adjustment will be made through the following steps, then adjusted values will be written to the EEPROM.

CD Adjustment Steps

1. Sled Tilt Rest
2. Disc Check Memory CD
3. Wait 500 msec
4. Set Disc Type CD
5. LD ON
6. Spdl Start
7. Wait 1 sec
8. Focus Search ON
9. Focus Search OFF
10. Focus Servo ON 1
11. Auto Track Offset Adjust
12. Tracking ON
13. (TC Display Start)
14. CLVA ON
15. Wait 1 sec
16. Jitter Display Start
17. Sled ON
18. Check CLV ON
19. Auto LFO Adjust
20. Auto Focus Offset Adjust
21. Auto Focus Gain Adjust
22. Auto Focus Offset Adjust
23. Eq Boost Adjust
24. Auto LFO Adjust
25. Auto Track Gain Adjust
26. All Servo Stop

3. DVD-DL (dual layer)

Select [3], insert DVD dual layer disc, and press [ENTER] key, and the adjustment will be made through the following steps, then adjusted values will be written to the EEPROM.

DVD Dual Layer Disc Adjustment Steps

1. Sled Tilt Reset
2. Disc Check Memory DL
3. Wait 500 msec
4. Set Disc Type DL
5. LD ON
6. Spdl Start
7. Wait 1 sec
   Layer 1 Adjust
8. Focus Servo ON 1
9. Auto Track Offset Adjust
10. Tracking ON
11. Clva ON
12. Wait 1 sec
13. Sled ON
14. Check CLV Lock
15. Auto Loop Filter Offset Adjust
16. Auto Focus Offset Adjust
17. Auto Focus Gain Adjust
18. Auto Focus Offset Adjust
19. Eq Boost Adjust
20. Auto Loop Filter Offset
21. Auto Track Gain Adjust
    Layer 0 Adjust
22. Fj (L1 → L0)
23. Auto Track Offset Adjust L0
24. Tracking ON
25. Clva ON
26. Wait 1 sec
27. Sled ON
28. Check CLV Lock
29. Auto Loop Filter Offset Adjust
30. Auto Focus Offset Adjust
31. Auto Focus Gain Adjust
32. Auto Focus Offset Adjust
33. Eq Boost Adjust
34. Auto Loop Filter Offset
35. Auto Track Gain Adjust
36. All Servo Stop

4. SACD

Select [4], insert SACD disc, and press [ENTER] key, and the adjustment will be made through the following steps, then adjusted values will be written to the EEPROM. However, if SACD disc is not available, use the player with initial data, skipping the SACD adjustment. In this case, you can finish the adjustment if pressing the [STOP] button.

SACD Adjustment Steps

1. Sled Tilt Reset
2. Set Disc Type CD
3. LD ON
4. Spdl Start
5. Wait 1 sec
6. Focus Servo ON 0
7. Auto track Offset Adjust
8. Tracking ON
9. CLVA ON
10. Wait 1 sec
11. Sled ON
12. Check CLV ON
13. Auto LFO Adjust
14. Auto Focus Offset Adjust
15. Auto Focus Gain Adjust
16. Auto Focus Offset Adjust
17. Eq Boost Adjust
18. Auto LFO Adjust
19. Auto Track Gain Adjust
20. All Servo Stop

6-5. DRIVE MANUAL OPERATION

On the Test Mode Menu screen, select [2], and the manual operation menu will be displayed. For the manual operation, each servo on/off control and adjustment can be executed manually.

```
 ## Drive Manual Operation ##

        Operation Menu
1. Disc type
2. Servo Control
3. Track/Layer Jump
4. Manual Adjustment
5. Auto Adjustment
6. Memory Check

0. Disc Check Memory

               Exit: Return
```

In using the manual operation menu, take care of the following points. These commands do not provide protection, thus requiring correct operation. The sector address or time code field is displayed when a disc is loaded.

1. Set correctly the disc type to be used on the Disc Type screen.
   The disc type must be set after a disc was loaded.
   The set disc type is cleared when the tray is opened.
2. After power ON, if the Drive Manual Operation was selected, first perform “Reset SLED TILT” by opening 1. Disc Type screen.
3. In case of an alarm, immediately press the [STOP] button to stop the servo operation, and turn the power OFF.

Basic operation (controllable from front panel or remote commander)

[POWER]	Power OFF
[STOP]	Servo stop
[OPEN/CLOSE]	Stop+Eject/Loading
[RETURN]	Return to Operation Menu or Test Mode Menu
[NEXT], [PREV]	Transition between sub modes of menu
[1] to [9], [0]	Selection of menu items
Cursor UP/DOWN	Increase/Decrease in manually adjusted value

0. Disc Check Memory

```
              Disc Check



1. SL Disc Check
2. CD Disc Check
3. DL Disc Check




0. Reset SLED TILT
```

On this screen, the mirror time is measured to judge the disc and it is written to the EEPROM. First load DVD SL disc and press [1], next load CD disc and press [2], and finally load DVD DL disc and press [3].
The adjustment must be executed more than once after default data were written. External vibration or shock to the player must not be given. Reference value for DVD is from 10 to 20, and for CD, from 28 to 4F.
Check that the value of CD is larger than that of DVD.
When those values are beyond a range perform this adjustment again.
From this screen, you can go to another mode by pressing [NEXT] or [PREV] key, but you cannot enter this mode from another mode. You can enter this mode from the Operation Menu screen only.

1. Disc Type

```
              Disc Type
1. Disc Type Auto Check
2. DVD SL   12 cm
3. DVD DL   12 cm
4. CD       12cm
5. SACD     12 cm
6. DVD SL   8 cm
7. DVD DL   8 cm
8. CD       8 cm
9. SACD     8 cm
0. Reset SLED TILT
                              EMG. 00
```

On this screen, select the disc type. To select the disc type, press the number of the loaded disc. The selected disc type is displayed at the bottom. Selecting [1] automatically selects and displays the disc type. In case of wrong display, retry “Disc Check Memory”. Also, opening the tray causes the set disc type to be cleared. In this case, set the disc type again after loading.
In performing manual operation, the disc type must be set.
Once the disc type has been selected, the sector address or time code display field will appear as shown below. These values are displayed when PLL is locked.

```
              Disc Type
1. Disc Type Auto Check
2. DVD SL   12 cm
3. DVD DL   12 cm
4. CD       12cm
5. SACD     12 cm
6. DVD SL   8 cm
7. DVD DL   8 cm
8. CD       8 cm
9. SACD     8 cm
0. Reset SLED TILT
        SA.____ SI.__ EMG. 00
DVD SL 12 cm
```

Display when DVD SL 12cm disc was selected

```
              Disc Type
1. Disc Type Auto Check
2. DVD SL   12 cm
3. DVD DL   12 cm
4. CD       12cm
5. SACD     12 cm
6. DVD SL   8 cm
7. DVD DL   8 cm
8. CD       8 cm
9. SACD     8 cm
0. Reset SLED TILT
         TC.__:__:__ EMG. 00
CD   12 cm
```

Display when CD 12cm disc was selected

[0] Reset SLED TILT	Reset the Sled and Tilt to initial position.
[1] Disk Type Check	Judge automatically the loaded disc. As the judged result is displayed at the bottom of screen, make sure that it is correct. If Disc Check Memory menu has not been executed after EEPROM default setting, the disc type cannot be judged. In this case, return to the initial menu and make a check for three types of discs (SL, DL, CD).
[2] to [9]	Select the loaded disc. The adjusted value is written to the address of selected disc. No further entry is necessary if [1] was selected.

2. Servo Control

```
         Servo Control
1. LD        Off R.Sled FWD
2. SP        Off L.Sled REV
3. Focus     Off U.Tilt Up
4. TRK.      Off D.Tilt Down
5. Sled      Off
6. CLVA      Off
7. FCS. Srch Off


0. Reset SLED TILT
        SA.____ SI.__ EMG. 00
DVD SL 12 cm
```

On this screen, the servo on/off control necessary for replay is executed. Normally, turn on each servo from 1 sequentially and when CLVA is turned on, the usual trace mode becomes active. In the trace mode, DVD sector address or CD time code is displayed. This is not displayed where the spindle is not locked.
The spindle could run overriding the control if the spindle system is faulty or RF is not present. In such a case, do not operate CLVA.

[0]	Reset SLED TILT	Reset the Sled and Tilt to initial position.
[1]	LD	Turn ON/OFF the laser.
[2]	SP	Turn ON/OFF the spindle.
[3]	Focus	Search the focus and turn on the focus.
[4]	TRK	Turn ON/OFF the tracking servo.
[5]	Sled	Turn ON/OFF the sled servo.
[6]	CLVA	Turn ON/OFF normal servo of spindle servo.
[7]	FCS. Srch	Apply same voltage as that of focus search to the focus drive to check the focus drive system.
[→]	Sled FWD	Move the sled outward. Perform this operation with the tracking servo turned off.
[←]	Sled REV	Move the sled inward. Perform this operation with the tracking servo turned off.
[↑]	Tilt UP	Move the tilt upward.
[↓]	Tilt DOWN	Move the tilt downward.

The following menus are normally not used.

3. Track/Layer Jump
4. Manual Adjustment
5. Auto Adjustment

The persons who do not know well about these menus should not use them.

6. Memory Check

```
EEPROM DATA            -- DL --
             CD SACD  SL  L0  L1
Focus Gain    xx xx   xx  xx  xx
TRK. Gain     xx xx   xx  xx  xx
Focus Offset  xx xx   xx  xx  xx
TRK. Offset   xx xx   xx  xx  xx
L. F. Offset  xx xx   xx  xx  xx
Analog FRSW   xx xx   xx  xx  xx
PLL DAC Gain  xx xx   xx  xx  xx
EQ Boost      xx xx   xx  xx  xx
Jitter        xx xx   xx  xx  xx
Mirror Time   xx      xx  xx
_            CLEAR: Default Set
```

This screen displays current servo adjusted data stored in the EEPROM. Though adjusted data can be initialized with the [CLEAR] key, they cannot be restored after initialization.
So, before clearing, make a note of the adjusted data.
For reference, the drive has been designed so that the gain center value is 20 and offset value is 80. Other values will be in a range of 10 to 80. If extreme value such as 00 or FF is set, adjustment will be faulty. In such a case, check for disc scratch or cable disconnection, then perform adjustment again.

6-6. MECHA AGING

```
       ### Mecha Aging ###



Press OPEN key



Abort: STOP key
```

On the Test Mode Menu screen, selecting [3] executes the aging of mechanism. First, open the tray and load a disc. Press the [PLAY] key, and the aging will start. When the tray is closed, the disc type and size are judged and displayed. During aging, the repeat cycle is displayed. Aging can be aborted at any time by pressing the [STOP] key. After the operation has stopped, unload the disc and press again the [STOP] key or the [RETURN] key to return to the Test Mode Menu.

6-7. EMERGENCY HISTORY

```
      ### MEG. History ###

Laser Hours     CD   xxxxxxxh
                DVD  xxxxxxxh

1. 00 00 00 00  00 00 00 00
   00 00 00 00  00 00 00 00

2. 00 00 00 00  00 00 00 00
   00 00 00 00  00 00 00 00

Select: 1 – 9   Scroll: UP/DOWN
(1: Last EMG.)  Exit: Return
```

On the Test Mode Menu screen, selecting [4] displays the information such as servo emergency history. The history information from last 1 up to 10 can be scrolled with [↑] key or [↓] key. Also, specific information can be displayed by directly entering that number with ten keys.

The upper two lines display the laser ON total hours. Data below minutes are omitted.

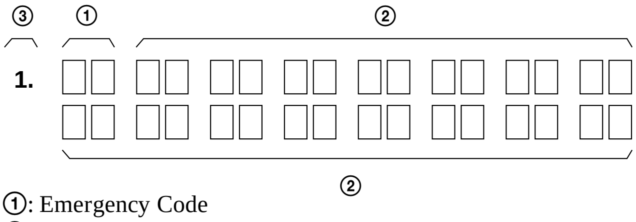
Clearing History Information

Clearing laser hours
◎ Press [DISPLAY] and [CLEAR] keys in this order.
Both CD and DVD data are cleared.

Clearing emergency history
◎ Press [TITLE] and [CLEAR] keys in this order.

Initializing set up data
◎ Press [DVD] and [CLEAR] keys in this order.
The data have been initialized when “Set Up Initialized” message is displayed. The EMG. History screen will be restored soon.

How to see Emergency History



①: Emergency Code
②: Don't Care
These codes are used for verification of software designing.
③: Historical order 1 to 9

Emergency Codes List

10: Communication to IC201 (MB-86 board) failed.
11: Each servo for focus, tracking, and spindle is unlocked.
12: Communication to EEPROM, IC101 (MB-86 board) failed.
13: Writing of hours meter data to EEPROM, IC101 (MB-86 board) failed.
14: Communication to Servo DSP IC404 (MB-86 board) failed, or Servo DSP is faulty.
20: Initialization of tilt servo and sled servo failed. They are not placed in the initial position.
21: Tilt servo operation error
22: Syscon made a request to move the tilt servo to wrong position.
23: Sled servo operation error
24: Syscon made a request to move the sled servo to wrong position.
30: Tracking balance adjustment error
31: Tracking gain adjustment error
32: Focus balance adjustment error
33: Focus bias adjustment error
34: Focus gain adjustment error
35: Tilt servo adjustment error
36: RF equalizer adjustment error
37: RF group delay adjustment error
38: Jitter value after adaptive servo operation is too large.
40: Focus servo does not operate.
41: With a dual layer (DL) disc, focus jump failed.
50: CLV (spindle) servo does not operate.
51: Spindle does not stop.
60: With a DVD disc, Syscon made a request to seek nonexistent address.
61: With a CD disc, Syscon made a request to seek nonexistent address.
62: With a CD disc, Syscon made a request to seek nonexistent track No. and index No.
63: With a DVD disc, seeking of target address failed.
64: With a CD disc, seeking of target address failed.
65: With a CD disc, seeking of target index failed.
70: With a DVD disc, physical information data could not be read.
71: With a CD disc, TOC data could not be read.
80: Disc type judgment failed.
81: As disc type judgment failed, retry was repeated.
82: As disc type judgment failed, a measurement error occurred.
83: Disc type could not be judged within the specified time.
84: Illegal command code was received from Syscon.
85: Illegal command was received from Syscon.

6-8. VERSION INFORMATION

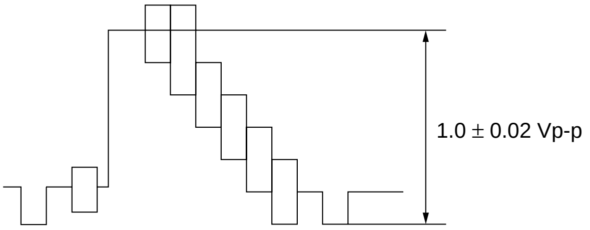
```
   ## Version Information ##

IF con.    Ver. x. xxx (xxxx)
           Group    00

SYScon.    Ver. x. xxx (xxxx)
           Model    xx
           Region   0x
Servo DSP. Ver. 1. xxxx


Exit: RETURN
```

On the Test Mode Menu screen, selecting [5] displays the ROM version and region code.
The parenthesized hexadecimal number in version field is checksum value of ROM.

6-9. VIDEO LEVEL ADJUSTMENT

On the Test Mode Menu screen, selecting [6] displays color bars for video level adjustment. During display of color bars, OSD disappears but the menu screen will be restored if pressing any key.

Measurement point : LINE OUT VIDEO
(75 Ω terminating resistance)
Measuring instrument : Oscilloscope
Adjustment device : RV501 on MB-86 board
Specified value : 1.0 ± 0.02 Vp-p



6-10. IF CON SELF DIAGNOSTIC FUNCTION

1. AI-22 BOARD (IF CON) TEST MODE

The AI-22 board (IF CON) test mode is the IF CON self diagnostic mode. The IF CON can diagnose the functions of the front panel boards that the IF CON controls. Normally, the IF CON makes a serial communication with the SYSTEM CONTROL and operates following thecommands from the SYSTEM CONTROL, but in the Test mode, the IF CON operates independently from the SYSTEM CONTROL.

In the Test mode, the following functions can be checked.

1. Button function
2. Remocon receiving function
3. SYSTEM CONTROL-IF CON serial communication
4. Click shuttle function
5. Fluorescent display tube lighting check
   Grid check
   Anode check
6. LED control function

In the Test mode, the set operates same as usual, except voltage monitoring, communication monitoring, display of fluorescent display tube, and LED control.

1. The routine that monitors +3.3 V (PCONT) of MB-86 board is not provided.
2. The monitoring timer for serial communication with the SYSTEM CONTROL is not provided. The set is not placed in the Standby mode, even if the communication with SYSTEM CONTROL is normal.
3. Display of fluorescent display tube (normally, display is made following the commands from SYSTEM CONTROL)
4. LED control (normally, control is made following the commands from SYSTEM CONTROL)

2. OPERATION OF SELF CHECK MODE

The Self Check mode is the function to conduct the basic test to the FL display and DVD panel section.

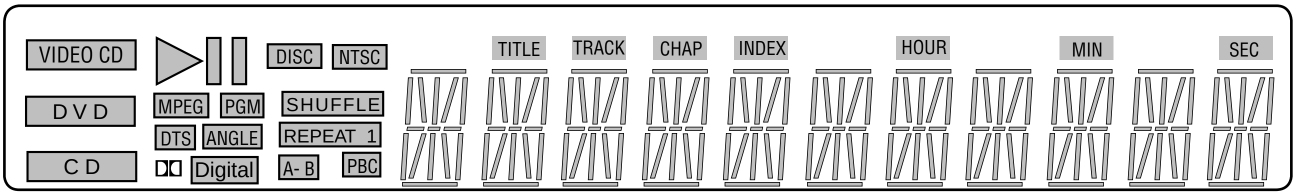
2-1. Self Check Mode Transition Processing

At the AC Power ON after IF CON was reset, the input to 8pin (SELF CHECK) of IC404 is judged and if "Low" is entered, the main unit transits to the Self Check mode. In this port input judgment, the result of 3-time attempts must be same (assuming that the MB-86 board is not connected). While pressing the [STOP] key on the main unit with the IF CON in STANDBY mode, enter [RETURN] → [DISPLAY] (or [SET UP]) on the remote commander, and the unit transits to the Self Check Mode. The Self Check mode terminates when the IF CON transits to the STANDBY mode.

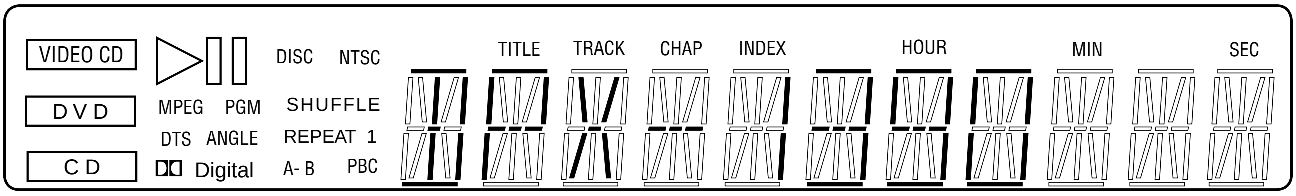
2-2. Operation of Auto Self Check

When the Self Check mode becomes active at the AC Power ON or by key input, the test display of the following steps (1) to (4) is repeated.

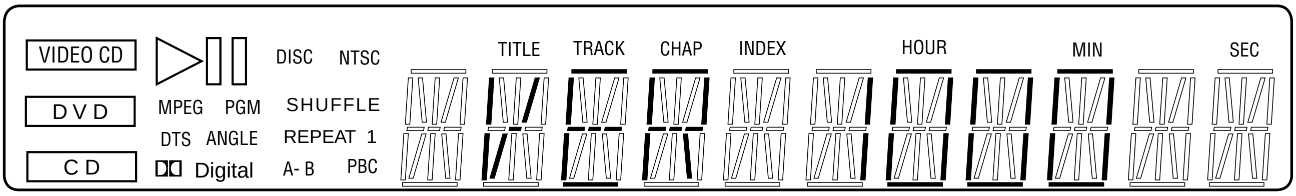
(1) FLD and LED all ON (for 5 seconds)



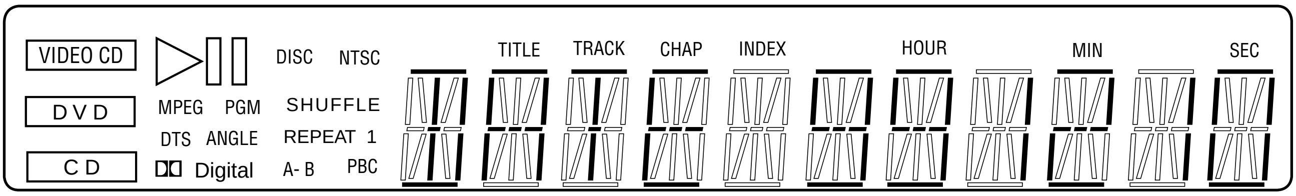
(2) MODEL display (for 2 seconds)



(3) Version display (for 2 seconds)



(4) ROM creation date display (for 2 seconds)



2-3. Each Self Check Function

Each Self Check function tests the FLD display, LED display, and key input.

Input Voltage [V]	IC404: Pin No. (Signal)			
	Pin ③ (AN3)	Pin ② (AN4)	Pin ① (AN5)	Pin (79) (AN7)
0	STOP	TITLE	RIGHT	VES
0.70	PAUSE	DVD MENU	UP	
1.31	DISPLAY	NEXT	ENTER	
1.97	RETURN	PREV	DOWN	
2.59			LEFT	
3.3				

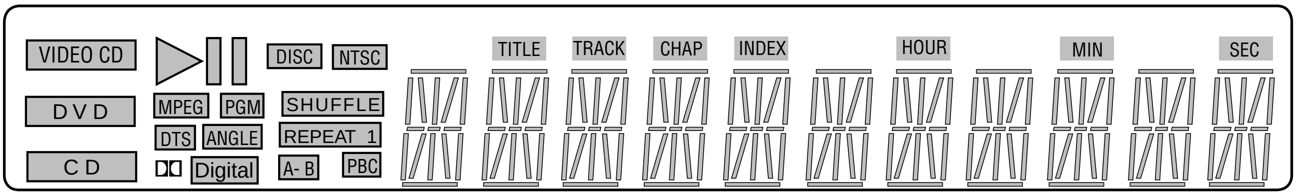
2-3-1. FLD and LED All ON

2-3-1-1. Transition Keys in Self Check Mode

- [STOP] key and [PLAY] key on the main unit
- [LEFT] key on the main unit and the remote commander

2-3-1-2. Operation and Display

In this mode, all LEDs except STANDBY LED and all segments of FLD turn ON.
Example of FLD all ON



2-3-2. Main Unit Key Name Display and Key Code Display

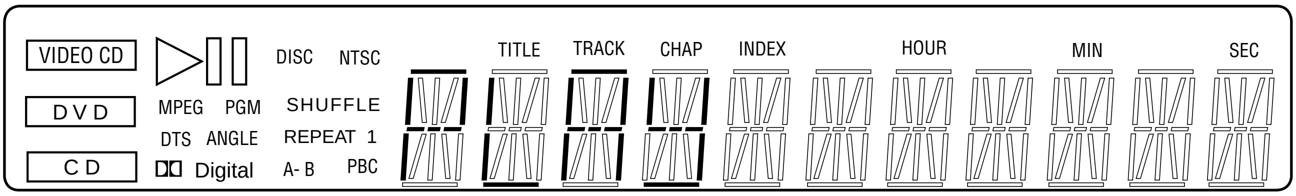
2-3-2-1. Transition Keys in Self Check Mode

- Keys on main unit except keys transited in self check

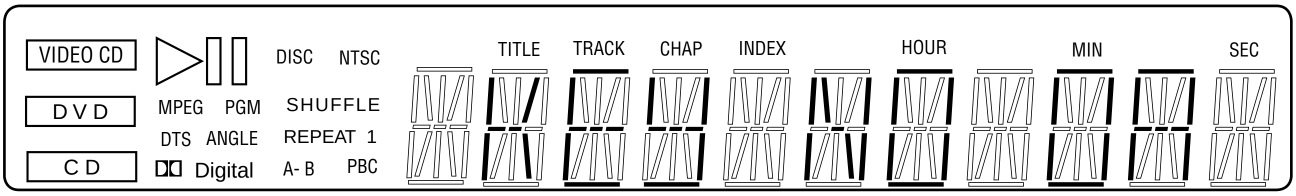
2-3-2-2. Operation and Display

When a key on the main unit is pressed in the Self Check mode, the name of that key is displayed on the FLD. Also, the key name display and the key code display can be switched with the [DISPLAY] key on the remote commander. "NOTHING" is displayed when nothing is entered. Also, VIDEO CD, DVD, and CD segments turn on when a communication error occurred.

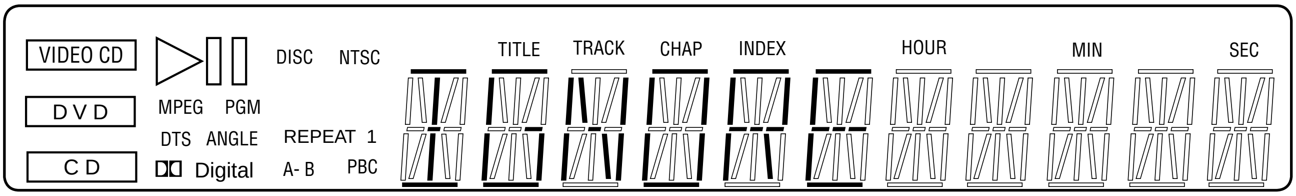
FLD display (at input of [PLAY] key on the main unit)



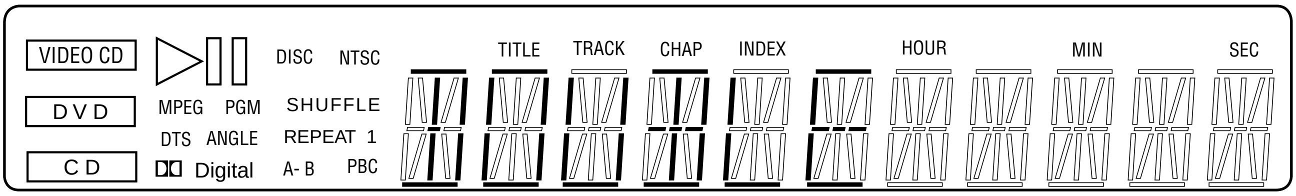
Key code display (at input of PLAY key, Key code: 0Ah)



At input of faulty voltage



When two keys are pressed



2-3-3. Remote Commander Key Name Display and Key Code Display

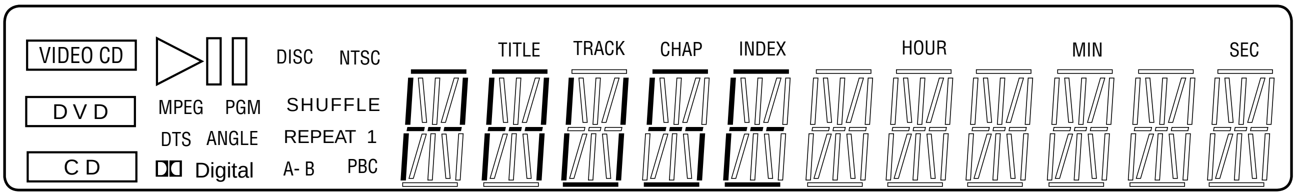
2-3-3-1. Transition Keys in Self Check Mode

- Remote commander keys except keys transited in self check

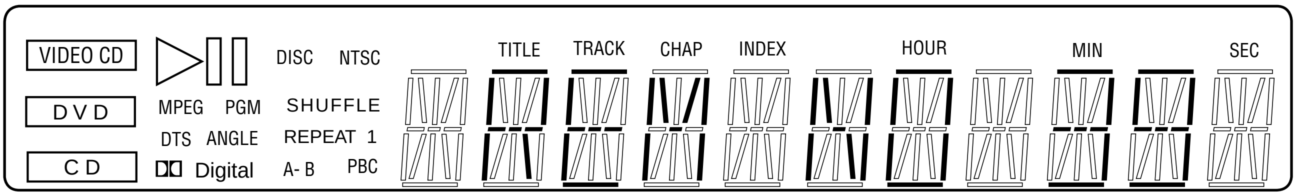
2-3-3-2. Operation and Display

When a key on the remote commander is pressed in the Self Check mode, the name of that key is displayed on the FLD. Also, the key name display and the key code display can be switched with the DISPLAY key on the remote commander. “NOTHING” is displayed when nothing is entered. Also, VIDEO CD, DVD, and CD segments turn on when a communication error occurred.

Remote commander key name display (at input of PAUSE key)



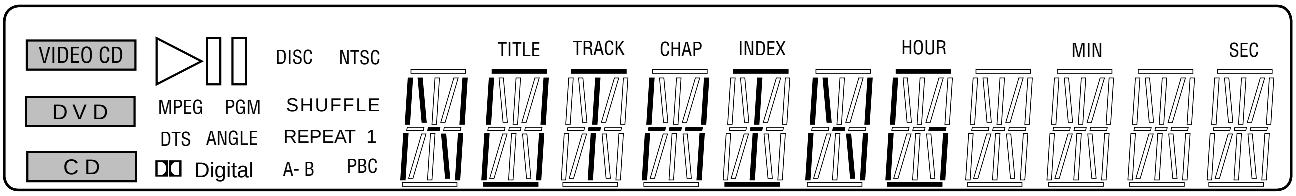
Remote commander key code display (at input of PAUSE key, Key code: 39h)



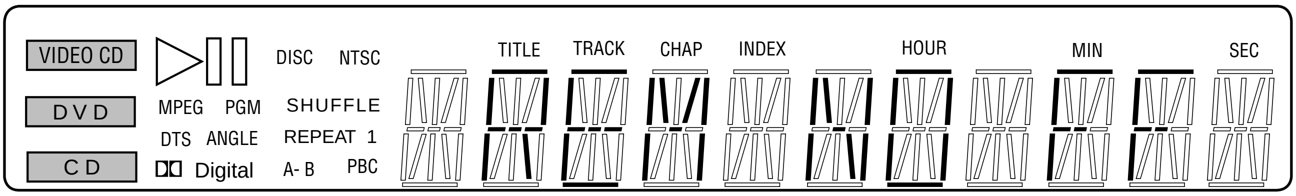
2-3-4. Communication Monitoring Display

The communication state is monitored and displayed while the key name on the main unit and the remote commander is displayed. When the communication to the System Controller failed, VIDEO CD, DVD, and CD segments turn on.

Communication error display (at no key input)



Communication error display (at code display without input of the remote commander)



2-3-5. FLD Anode Test Display and SHUTTLE Click Operation Test

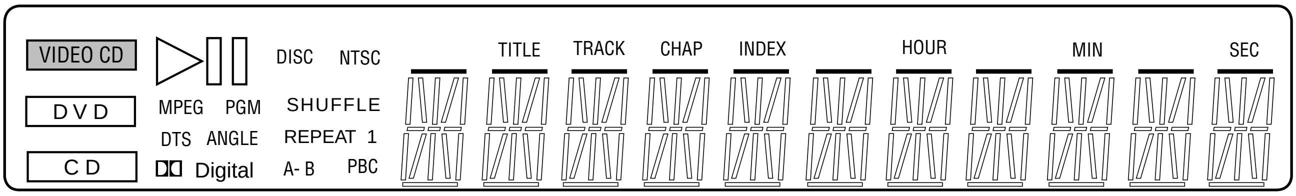
2-3-5-1. Transition Keys in Self Check Mode

- RIGHT on the main unit and the remote commander
- SHUTTLE on the main unit and the remote commander during Anode Test display

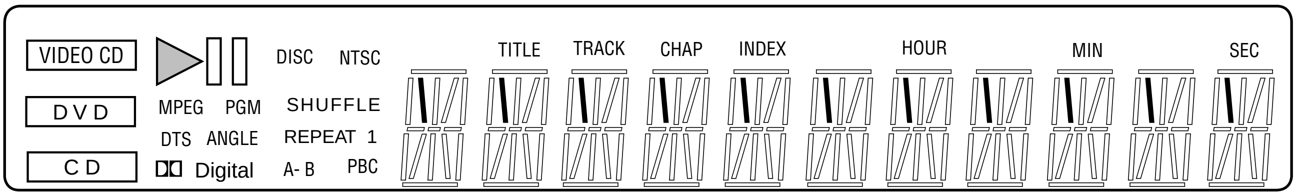
2-3-5-2. Operation and Display

The Self Check mode transits to this mode when RIGHT key is entered. Only the first segment of each grid of FLD turns on, and each time the SHUTTLE is entered, the segment of each grid is switched in order. When SHUTTLE input is clockwise, the segment switches in 1 → 2 → 3 direction, or counterclockwise it switches in 3 → 2 → 1 direction. This tests whether each segment turns on individually. Also, if the main unit does not have the JOG/SHUTTLE, use the remote commander JOG/SHUTTLE to switch over the segment display position.

Display at the start of Anode Test



↓ (Input in CW direction)



2-3-6. FLD Grid Test Display and SHUTTLE Click Operation Test

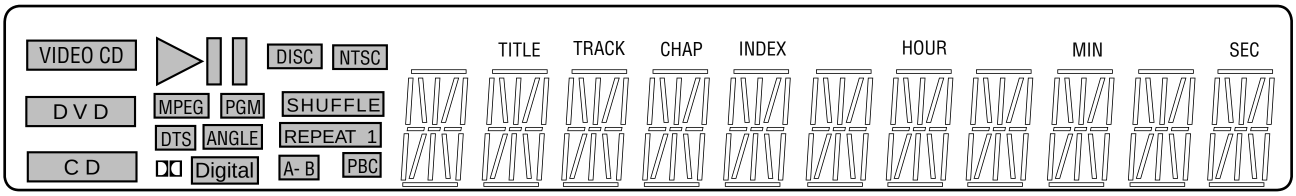
2-3-6-1. Transition Keys in Self Check Mode

- UP on the main unit and the remote commander
- SHUTTLE on the main unit and the remote commander during Grid Test display

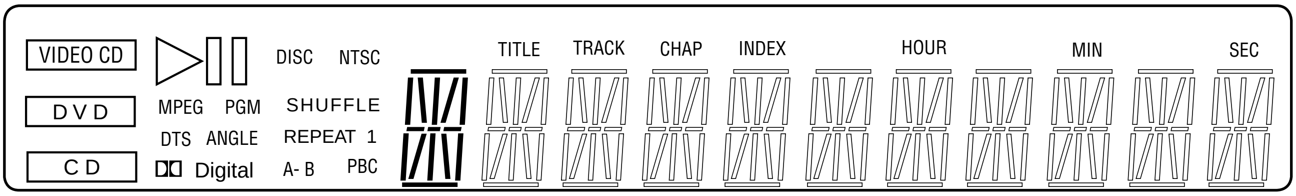
2-3-6-2. Operation and Display

The Self Check mode transits to this mode when UP key is entered. The first grid of FLD all turns on and other grids turn off. Each time the SHUTTLE is entered, the grid is switched in order. When SHUTTLE input is clockwise, the grid switches in 1 →2 →3 direction, or counterclockwise it switches in 3 →2 →1 direction. This tests whether each grid turns on individually.

Display at the start of Grid Test



↓ (Input in CW direction)



2-3-7. LED Test Display

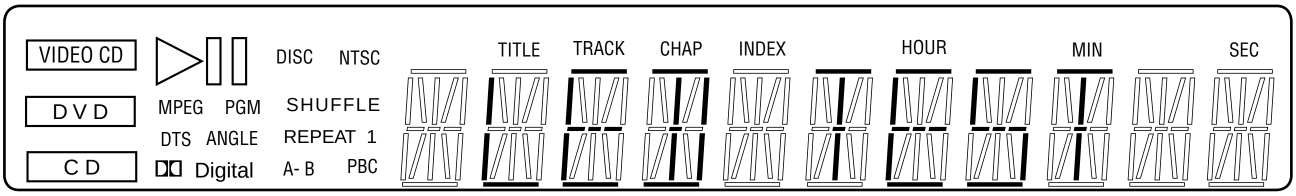
2-3-7-1. Transition Keys in Self Check Mode

- DOWN on the main unit and the remote commander
- SHUTTLE on the main unit and the remote commander during LED Test display

2-3-7-2. Operation and Display

LED is switched in order by the input of JOG/SHUTTLE. Also, LED ON/OFF is switched by the input of same key as the function that turns on the LED concerned. For the MULTI LED only, there is no key which switches that function, and therefore use the RETURN key on the main unit.

FLD display during LED Test



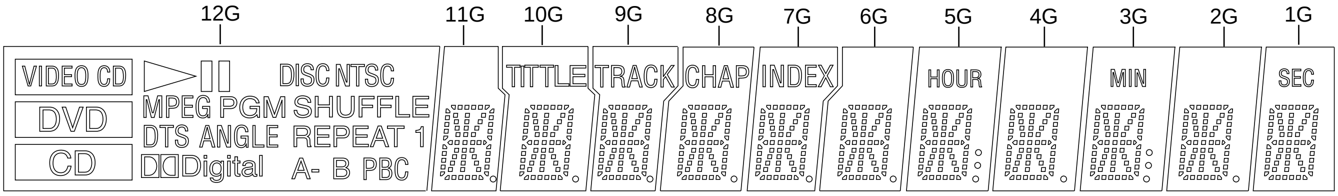
2-3-8. Beep Sound Test

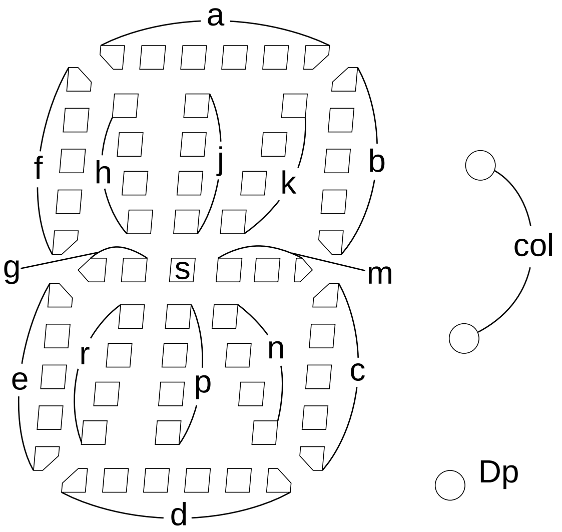
2-3-8-1. Transition Keys in Self Check Mode

- Input of a key on main unit

2-3-8-2. Operation and Display

In the Self Check mode, each time a key on the main unit is entered, a beep sound of 2kHz (100ms) is generated.





(12G~1G)

ANODE CONNECTION

	12G	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
P1	VIDEO CD	a	a	a	a	a	a	a	a	a	a	a
P2	▷	h	h	h	h	h	h	h	h	h	h	h
P3	‖	j	j	j	j	j	j	j	j	j	j	j
P4	DISC	k	k	k	k	k	k	k	k	k	k	k
P5	NTSC	b	b	b	b	b	b	b	b	b	b	b
P6	DVD	f	f	f	f	f	f	f	f	f	f	f
P7	MPEG	m	m	m	m	m	m	m	m	m	m	m
P8	PGM	s	s	s	s	s	s	s	s	s	s	s
P9	SHUFFLE	g	g	g	g	g	g	g	g	g	g	g
P10	DTS	e	e	e	e	e	e	e	e	e	e	e
P11	ANGLE	n	n	n	n	n	n	n	n	n	n	n
P12	REPEAT	p	p	p	p	p	p	p	p	p	p	p
P13	1	r	r	r	r	r	r	r	r	r	r	r
P14	PBC	c	c	c	c	c	c	c	c	c	c	c
P15	B	d	d	d	d	d	d	d	d	d	d	d
P16	A-	Dp	Dp	Dp	Dp	Dp	Dp	Dp	Dp	Dp	Dp	-
P17	DD Digital	-	-	-	-	-	-	col	-	col	-	-
P18	CD	-	TITLE	TRACK	CHAP	INDEX	-	HOUR	-	MIN	-	SEC

3. TROUBLESHOOTING

3-1. Test Mode is not activated

With the set assembled in the front panel, the Test mode does not become active if any button was pressed by any reason.Under this condition, the power is not turned on even in the normal status. (The set is kept in Standby status = Red LED is kept on) Not only the buttons are inactive, but also a signal from remote commander is not accepted. To check this condition, with the self check port (pin ⑧ of IF CON) kept in “Low” status, supply the AC power, so that the Test mode is forcibly activated. On the board, short the lands where SELF is printed. The IF CON checks the self check port only after the power on reset (only when AC is supplied; not in Standby status). If any button was pressed, the button name should be displayed on the FL display tube. Though no button is pressed this time, display of other than NOTHING implies that the button was pressed.

3-2. Power is not turned on

① Red (STANDBY) LED does not light up when AC was supplied. The power (EVER 3.3 V) is not supplied.
X401 is oscillating.

② Red (STANDBY) LED is kept on though POWER button was pressed. Any button is kept pressed.
PONCHK (IF CON pin ⑥) is over 0.1 V.

③ Green LED lights up when POWER button was pressed, but red LED lights up again after several seconds. PONCHK (IF CON pin ⑥) is abnormal. (Slow rise time from 0.1 V to 1.5 V. Voltage must be less than 1.5 V)
SYSTEM CONTROL does not operate normally.

3-3. Power is turned on and off repeatedly

EVER 3.3 V may not be supplied normaly. Check that D430 is not broken.

SECTION 7
ELECTRICAL ADJUSTMENT

In making adjustment, refer to 7-3. Adjustment Related Parts Arrangement.

Note: During diagnostic check, the characters and color bars can be seen only with the NTSC monitor. Therefore, for diagnostic check, use the monitor that supports both NTSC and PAL modes.

This section describes procedures and instructions necessary for adjusting electrical circuits in this set.

Instruments required:
1) Color monitor TV
2) Oscilloscope 1 or 2 phenomena, band width over 100 MHz, with delay mode
3) Frequency counter (over 8 digits)
4) Digital voltmeter
5) Standard commander (RMT-D116A)
6) DVD reference disc
   HLX-501 (J-6090-071-A) (dual layer)
   HLX-503 (J-6090-069-A) (single layer)
   HLX-504 (J-6090-088-A) (single layer)
   HLX-505 (J-6090-089-A) (dual layer)
7) SACD reference disc
   HLXA-509 (J-6090-090-A)
8) Extension cable (J-6090-100-A)
   MB-86 BOARD (CN501) ←→ AI-17 BOARD (CN101)
   MB-86 BOARD (CN701) ←→ AI-17 BOARD (CN201)

7-1. POWER SUPPLY ADJUSTMENT

1. Power Supply Check (HS16S9U BOARD)

Mode	E-E
Instrument	Digital voltmeter
EVER +3 V Check	
Test point	CN201 pin ①
Specification	3.6 ± 0.2 Vdc
SW +3 V Check	
Test point	CN201 pin ②, ③
Specification	3.4 ± 0.2 Vdc
EVER+5 V Check	
Test point	CN201 pin ④
Specification	5.3 ± 0.3 Vdc
SW +10 V Check	
Test point	CN201 pin ⑦, ⑧
Specification	$10.5\ ^{+1.0}_{-1.5}$ Vdc
SW –10 V Check	
Test point	CN201 pin ⑪
Specification	$-10.0\ ^{+1.5}_{-1.0}$ Vdc

Checking method:
1) Confirm that each voltage satisfies the specification.

7-2. ADJUSTMENT OF VIDEO SYSTEM

1. Video Level Adjustment (MB-86 BOARD)

<Purpose>

This adjustment is made to satisfy the NTSC standard, and if not adjusted correctly, the brightness will be too large or small.

Mode	Video level adjustment in test mode
Signal	Color bars
Test point	LINE OUT (VIDEO) connector (75 Ω terminated)
Instrument	Oscilloscope
Adjusting element	RV501
Specification	1.0 ± 0.02 Vp-p

Adjusting method:

1) In the test mode initial menu "6" Video Level Adjustment, set so that color bars are generated.
2) Adjust the RV501 to attain 1.0 ± 0.02 Vp-p.

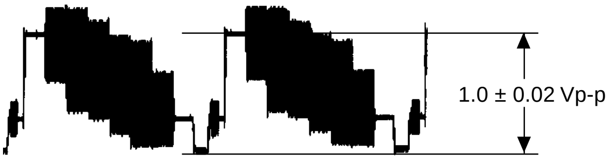


Figure 7-1

2. S-terminal Output Check (MB-86 BOARD)

<Purpose>

Check S-terminal video output. If it is incorrect, pictures will not be displayed correctly in spite of connection to the TV with a S-terminal cable.

Mode	Video level adjustment in test mode
Signal	Color bars
Test point	S VIDEO OUT (S-Y) connector (75 Ω terminated)
Instrument	Oscilloscope
Specification	1.0 ± 0.1 Vp-p

Checking method:

1) In the test mode initial menu "6" Video Level Adjustment, set so that color bars are generated.
2) Confirm that the S-Y level is 1.0 ± 0.1 Vp-p.

Figure 7-2

3. Checking Component Video Output B-Y (MB-86 BOARD)

<Purpose>

This checks component video output B-Y. If it is incorrect, correct colors will not be displayed when connected to, for instance, projector.

Mode	Video level adjustment in test mode
Signal	Color bars
Test point	COMPONENT VIDEO OUT (B-Y) connector (75 Ω terminated)
Instrument	Oscilloscope
Specification	700 ± 70 mVp-p

Checking method:

1) Confirm that the B-Y level is 700 ± 70 mVp-p.

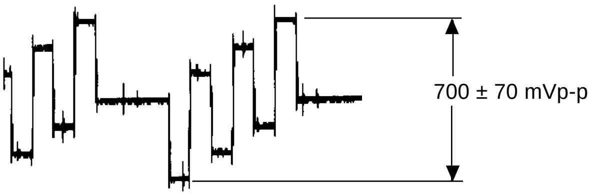


Figure 7-3

4. Checking Component Video Output R-Y (MB-86 BOARD)

<Purpose>

This checks component video output R-Y. If it is incorrect, correct colors will not be displayed when connected to, for instance, projector.

Mode	Video level adjustment in test mode
Signal	Color bars
Test point	COMPONENT VIDEO OUT (R-Y) connector (75 Ω terminated)
Instrument	Oscilloscope
Specification	700 ± 70 mVp-p

Checking method:

1) Confirm that the R-Y level is 700 ± 70 mVp-p.

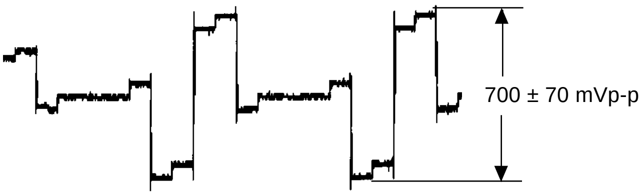


Figure 7-4

5. Checking Component Video Output Y (MB-86 BOARD)

<Purpose>

This checks component video output Y. If it is incorrect, correct brightness will not be attained when connected to, for instance, projector.

Mode	Video level adjustment in test mode
Signal	Color bars
Test point	COMPONENT VIDEO OUT (Y) connector (75 Ω terminated)
Instrument	Oscilloscope
Specification	1.0 ± 0.1 Vp-p

Checking method:

1) Confirm that the Y level is 1.0 ± 0.1 Vp-p.

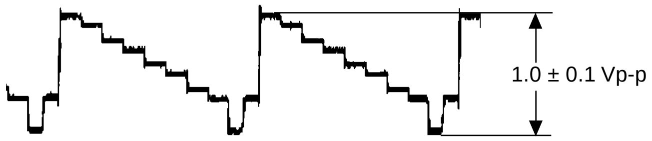


Figure 7-5

6. Checking S Video Output S-C (MB-86 BOARD)

<Purpose>

This checks whether the S-C satisfies the NTSC Standard. If it is not correct, the colors will be too dark or light.

Mode	Video level adjustment in test mode
Signal	Color bars
Test point	S VIDEO OUT (S-C) connector (75 Ω terminated)
Instrument	Oscilloscope
Specification	286 ± 50 mVp-p (NTSC) 300 ± 100 mVp-p (PAL)

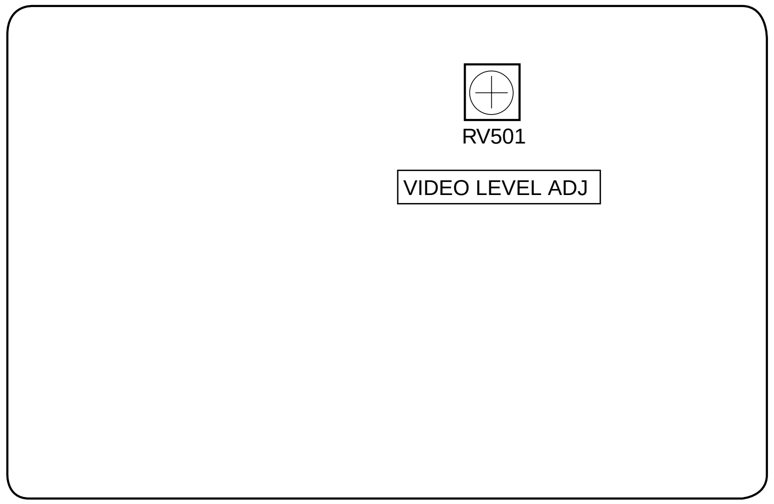
Checking method:

1) In the test mode initial menu “6” Video Level Adjustment, set so that color bars are generated.
2) Confirm that the S-C burst is 300 ± 100 mVp-p.

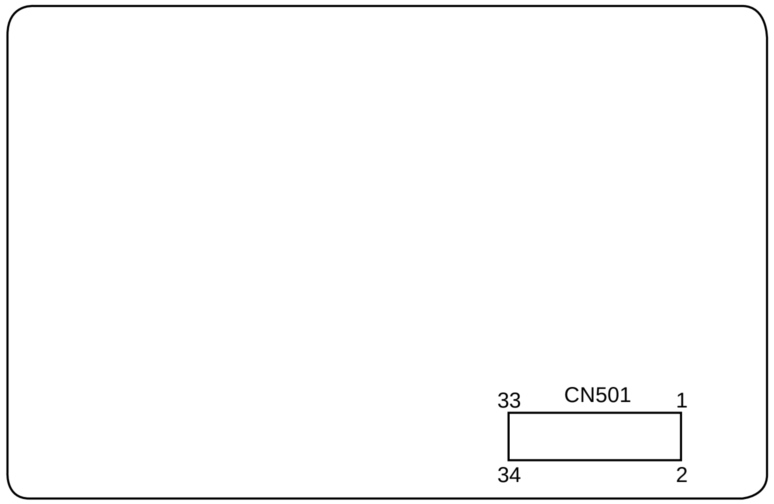
Figure 7-9

7-3. ADJUSTMENT RELATED PARTS ARRANGEMENT

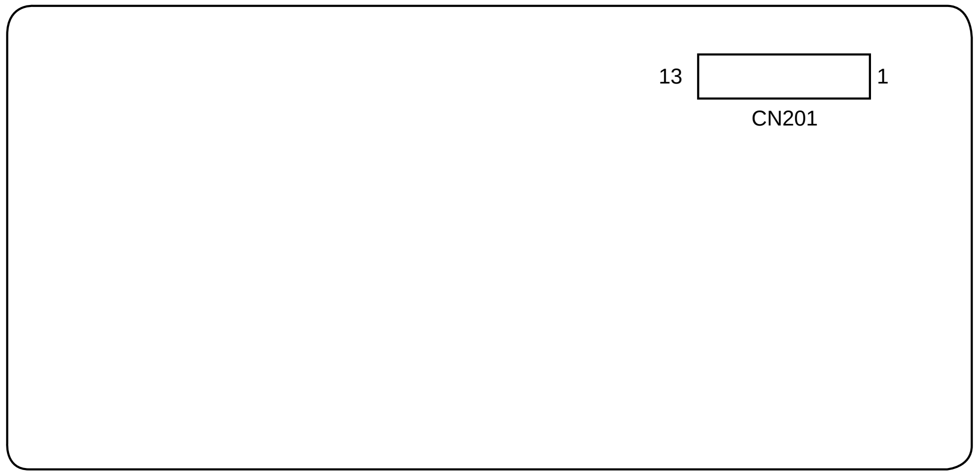
MB-86 BOARD (SIDE A)



MB-86 BOARD (SIDE B)



HS16S9U BOARD (SIDE A)



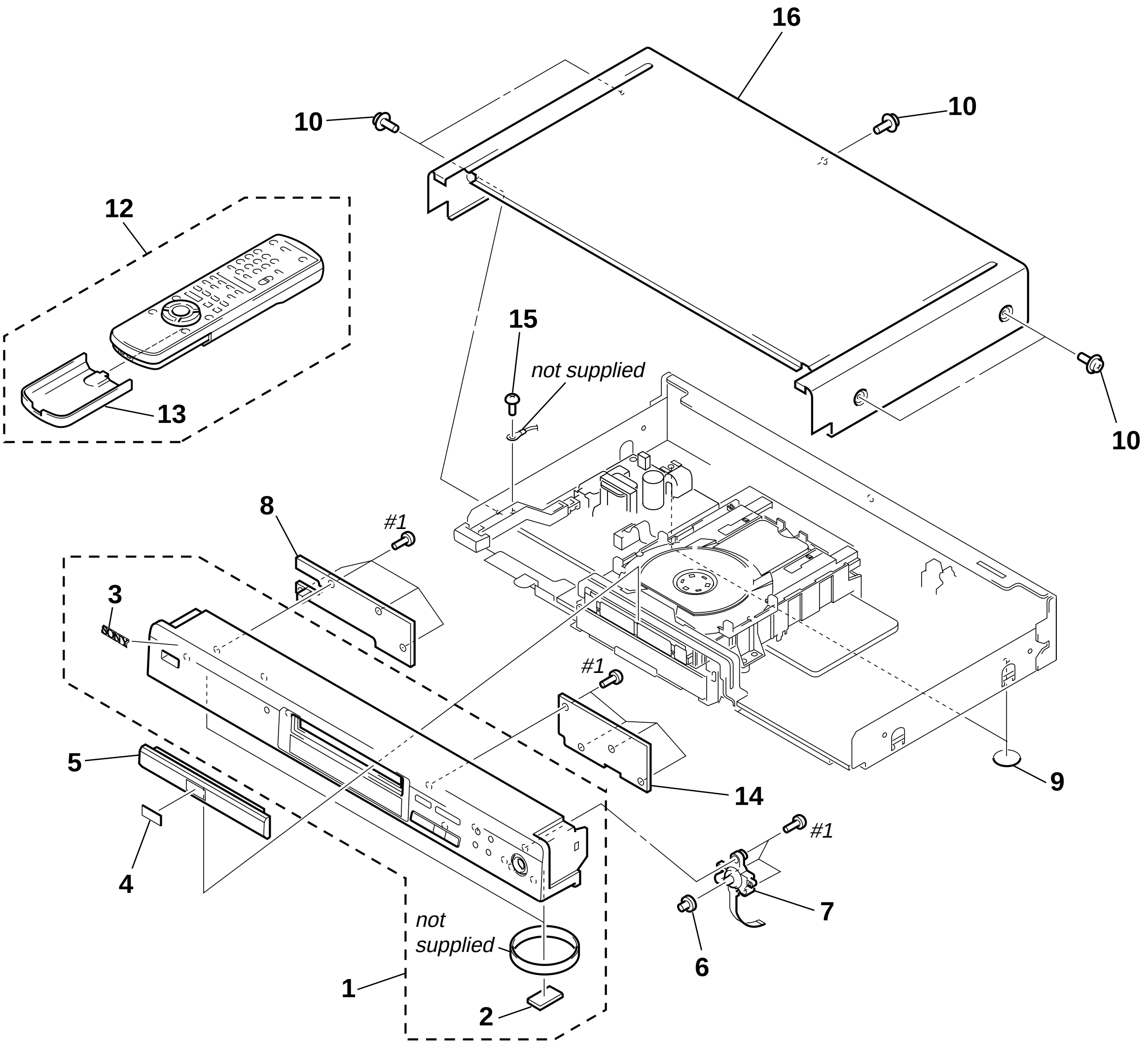
SECTION 8
REPAIR PARTS LIST

8-1. EXPLODED VIEWS

NOTE:
- -XX and -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Color Indication of Appearance Parts
  Example:
  KNOB, BALANCE (WHITE) . . . (RED)
  ↑ Parts Color ↑ Cabinet's Color
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list and accessories and packing materials are given in the last of the electrical parts list.

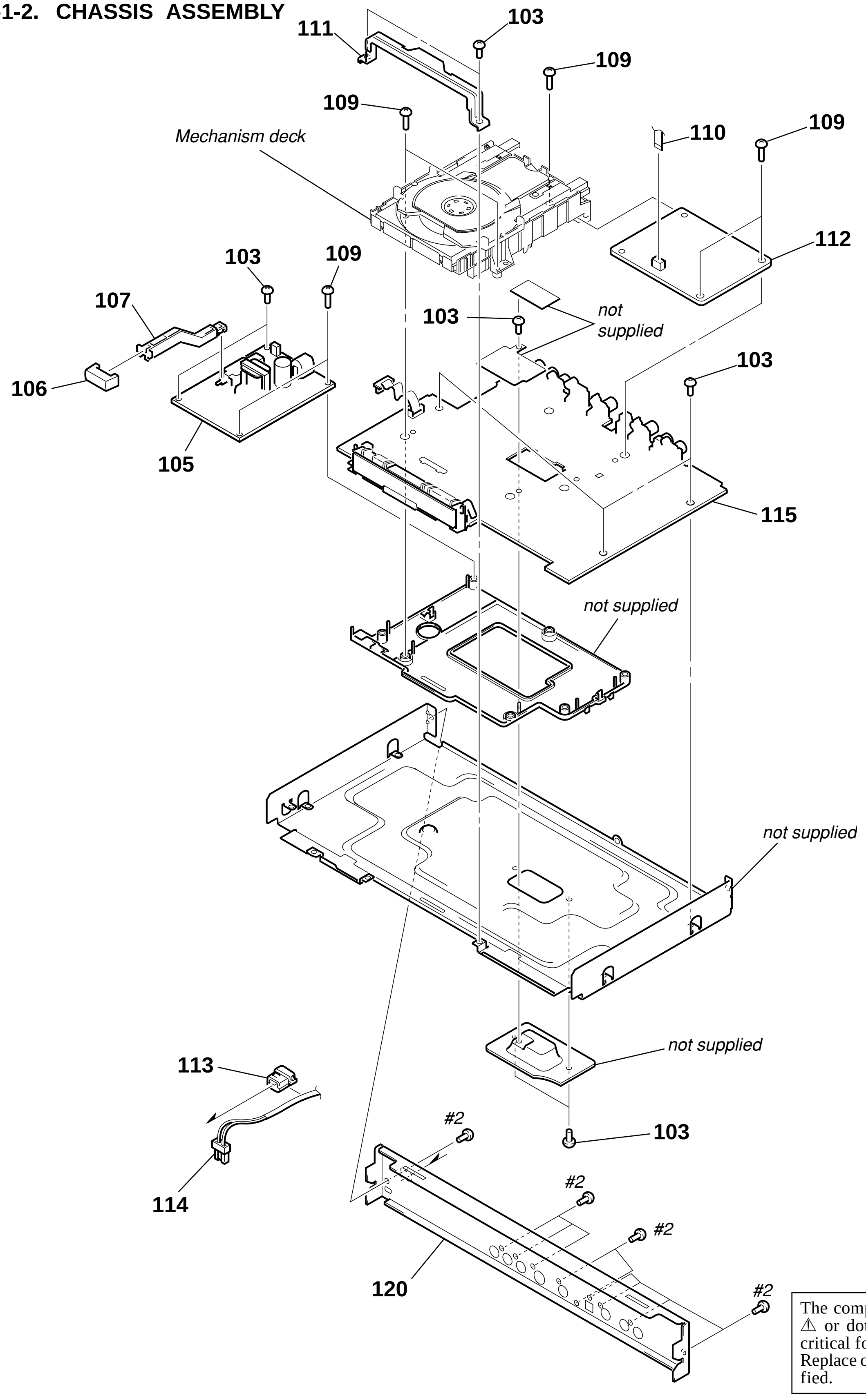
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

8-1-1. CASE ASSEMBLY



Ref. No.	Part No.	Description	Remark
1	X-3950-873-1	PANEL ASSY, FRONT	
2	3-059-349-11	CUSHION, FOOT	
3	4-996-698-41	EMBLEM, SONY	
4	3-975-726-71	EMBLEM, DVD	
5	3-061-842-01	COVER, TRAY	
6	3-061-846-01	STICK, CURSOR	
7	1-771-913-11	SWITCH, TACTILE	
* 8	A-6065-552-A	FL-118 BOARD, COMPLETE	
9	3-059-389-01	CUSHION (REAR), FOOT	
10	4-210-291-01	SCREW (CASE 3 TP2)	
12	1-418-990-11	COMMANDER, STANDARD (RMT-D116A)	
13	3-053-633-01	COVER, BATTERY (for RMT-D116A)	
* 14	A-6065-553-A	FR-177 BOARD, COMPLETE	
15	3-970-608-51	SUMITITE (B3), +BV	
16	3-061-852-01	CASE	

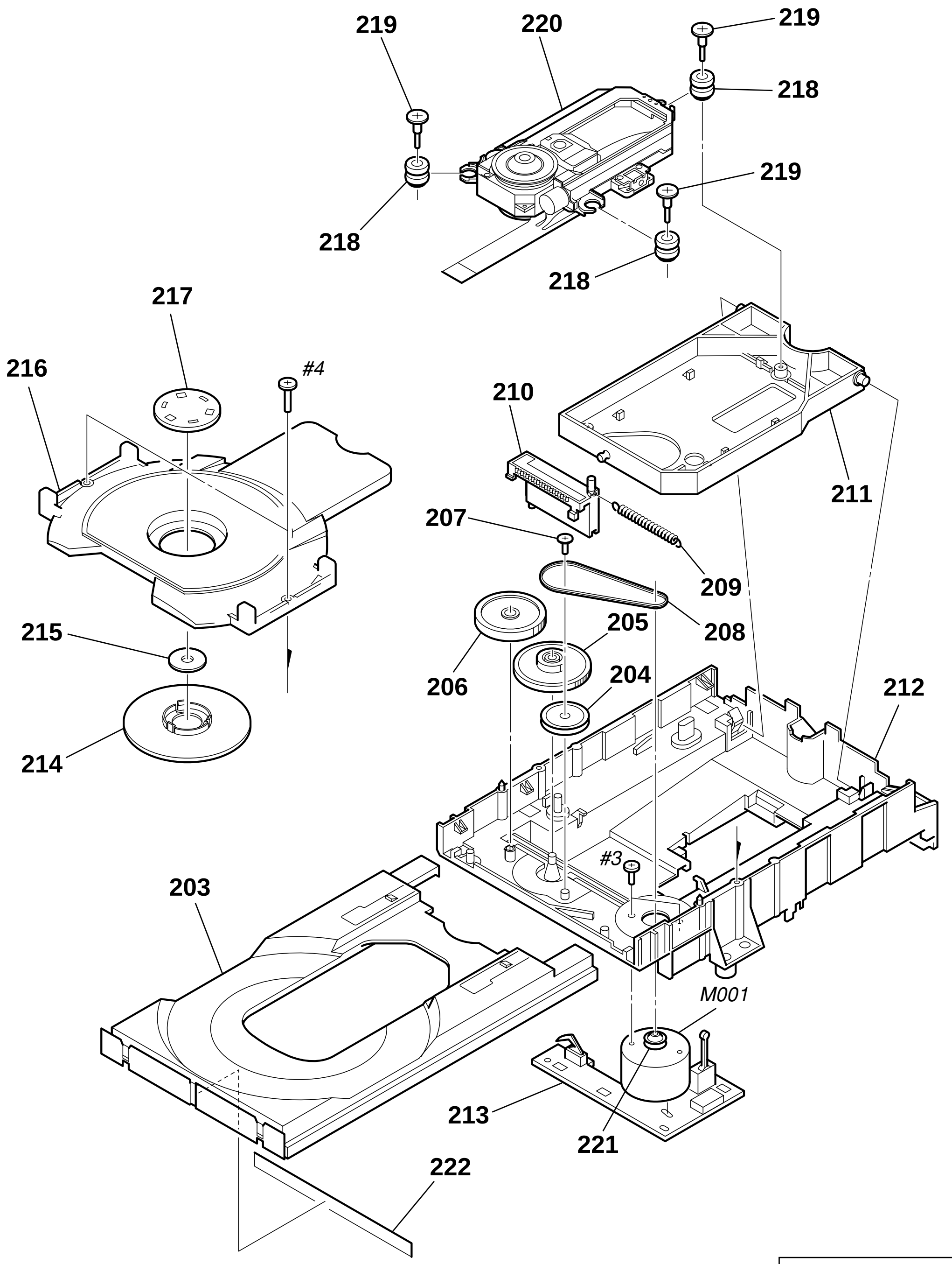
8-1-2. CHASSIS ASSEMBLY



The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description	Remark
103	3-970-608-51	SUMITITE (B3), +BV	
* 105	1-468-506-21	POWER BLOCK (HS16S9U)	
106	3-061-845-01	BUTTON, POWER	
107	3-061-866-01	JOINT (P)	
109	3-061-608-01	SCREW (B3) (3X18.5)	
110	1-792-457-11	CABLE, FLEXIBLE FLAT (FMM-33)	
111	3-061-854-01	PILLAR, MULTI	
* 112	A-6065-564-A	MB-86 BOARD,COMPLETE	
113	4-966-267-12	BUSHING (FBS001), CORD	
⚠114	1-792-211-41	CORD, POWER	
* 115	A-6065-551-A	AI-022 BOARD, COMPLETE	
120	3-061-853-01	PANEL, REAR	

8-1-3. MECHANISM DECK SECTION



The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description	Remark
203	3-061-875-01	TRAY	
204	3-061-882-01	GEAR, PULLEY	
205	3-061-881-01	GEAR, CAM DRIVING	
206	3-061-880-01	GEAR, TRAY DRIVING	
207	4-974-711-01	SCREW (2X5) (P TYIGHT), (+) PTTWH	
208	3-053-842-01	BELT	
209	3-053-849-01	SPRING, TENSION	
210	3-061-879-01	CAM, CHUCK	
211	3-061-877-01	HOLDER, BASE UNIT	
212	3-061-873-01	BASE, LOADING	
* 213	A-6066-016-A	MS-48 BOARD, COMPLETE	
214	3-061-884-01	PLATE, CHUCK	
215	3-061-886-01	YOKE	
216	3-061-878-01	HOLDER, CHUCK	
217	3-061-885-01	RETAINER, YOKE	
218	3-053-847-01	INSULATOR	
219	4-981-923-01	SCREW (M), STEP	
⚠220	A-6062-397-A	OPTICAL PICK-UP KHM-220AAA	
221	3-061-883-01	PULLEY, MOTOR	
222	3-055-097-01	SEAL, TRAY DUST	
M001	1-541-632-11	MOTOR, DC (LOADING)	

8-2. ELECTRICAL PARTS LIST

NOTE:
- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX and -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms.
  METAL: Metal-film resistor.
  METAL OXIDE: Metal oxide-film resistor.
  F: nonflammable
- Not all of the parts for POWER BLOCK (HS16S9U) are listed.
- Items marked "*" are not stocked since they are seldom required for routine service.
  Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u: μ, for example:
  uA. . : μA. . uPA. . : μPA. .
  uPB. . : μPB. . uPC. . : μPC. .
  uPD. . : μPD. .
- CAPACITORS
  uF: μF
- COILS
  uH: μH

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description			Remark
*	A-6065-551-A	AI-022 BOARD, COMPLETE			
		**********************			
		(Ref. No. 2,000 Series)			
	3-061-867-01	HOLDER (T), FL			
	3-061-869-01	HOLDER (U), FL			
		< CAPACITOR >			
C110	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C114	1-104-664-11	ELECT	47uF	20%	25V
C116	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C119	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C120	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C121	1-104-665-11	ELECT	100uF	20%	25V
C122	1-110-501-11	CERAMIC CHIP	0.33uF	10%	16V
C123	1-124-589-11	ELECT	47uF	20%	16V
C124	1-128-551-11	ELECT	22uF	20%	25V
C125	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C126	1-124-248-00	ELECT	22uF	20%	35V
C127	1-128-551-11	ELECT	22uF	20%	25V
C128	1-124-248-00	ELECT	22uF	20%	35V
C129	1-124-248-00	ELECT	22uF	20%	35V
C201	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C202	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C203	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C204	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C211	1-163-135-00	CERAMIC CHIP	560PF	5%	50V
C213	1-104-664-11	ELECT	47uF	20%	16V
C214	1-104-664-11	ELECT	47uF	20%	16V
C217	1-106-353-00	MYLAR	0.0027uF	5%	50V
C218	1-106-353-00	MYLAR	0.0027uF	5%	50V
C219	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C220	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C221	1-126-933-11	ELECT	100uF	20%	16V
C222	1-126-933-11	ELECT	100uF	20%	16V
C223	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C225	1-163-251-11	CERAMIC CHIP	100PF	5%	50V
C229	1-107-823-11	CERAMIC CHIP	0.47uF	10%	16V
C230	1-124-584-00	ELECT	100uF	20%	10V
C231	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C232	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C233	1-104-665-11	ELECT	100uF	20%	10V
C235	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C236	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C237	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C239	1-126-960-11	ELECT	1uF	20%	50V
C240	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C241	1-126-960-11	ELECT	1uF	20%	50V
C256	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C257	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C259	1-109-982-11	CERAMIC CHIP	1uF	10%	10V
C267	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C271	1-126-965-11	ELECT	22uF	20%	50V
C272	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C273	1-163-255-11	CERAMIC CHIP	150PF	5%	50V
C274	1-163-255-11	CERAMIC CHIP	150PF	5%	50V
C275	1-163-255-11	CERAMIC CHIP	150PF	5%	50V
C276	1-163-255-11	CERAMIC CHIP	150PF	5%	50V
C277	1-163-135-00	CERAMIC CHIP	560PF	5%	50V
C348	1-104-664-11	ELECT	47uF	20%	16V
C349	1-104-664-11	ELECT	47uF	20%	16V
C353	1-126-935-11	ELECT	470uF	20%	6.3V
C357	1-126-964-11	ELECT	10uF	20%	50V
C368	1-126-964-11	ELECT	10uF	20%	50V
C369	1-163-243-11	CERAMIC CHIP	47PF	5%	50V
C381	1-104-664-11	ELECT	47uF	20%	16V
C382	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C392	1-119-774-11	ELECT	100uF	20%	16V
C401	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C403	1-124-584-00	ELECT	100uF	20%	10V
C404	1-104-664-11	ELECT	47uF	20%	16V
C405	1-124-234-00	ELECT	22uF	20%	16V
C406	1-128-057-11	ELECT	330uF	20%	6.3V
C407	1-104-664-11	ELECT	47uF	20%	16V
C410	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C411	1-104-665-11	ELECT	100uF	20%	10V
C413	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C416	1-163-021-91	CERAMIC CHIP	0.01uF	10%	50V
C417	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C418	1-115-339-11	CERAMIC CHIP	0.1uF	10%	50V
C419	1-115-339-11	CERAMIC CHIP	0.1uF	10%	50V
C420	1-128-131-11	ELECT	22uF	20%	50V
C421	1-104-664-11	ELECT	47uF	20%	16V
C430	1-124-589-11	ELECT	47uF	20%	16V
C431	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C432	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V

Ref. No.	Part No.	Description	Remark
C433	1-109-982-11	CERAMIC CHIP 1uF 10%	10V
C434	1-109-982-11	CERAMIC CHIP 1uF 10%	10V
C451	1-163-133-00	CERAMIC CHIP 470PF 5%	50V
C490	1-163-259-91	CERAMIC CHIP 220PF 5%	50V
C491	1-163-259-91	CERAMIC CHIP 220PF 5%	50V
C492	1-163-259-91	CERAMIC CHIP 220PF 5%	50V
		< CONNECTOR >	
CN101	1-794-325-11	CONNECTOR, BOARD TO BOARD 34P	
CN201	1-794-325-11	CONNECTOR, BOARD TO BOARD 34P	
CN401	1-784-777-41	CONNECTOR, FFC 16P	
CN403	1-568-788-21	PIN, CONNECTOR 11P	
CN405	1-785-694-11	CONNECTOR, FFC/FPC 7P	
* CN412	1-564-721-11	PIN, CONNECTOR (SMALL TYPE) 5P	
* CN413	1-564-723-11	PIN, CONNECTOR (SMALL TYPE) 7P	
		< DIODE >	
D103	8-719-071-15	DIODE HZM6.8ZWA1TL	
D104	8-719-071-15	DIODE HZM6.8ZWA1TL	
D202	8-719-914-43	DIODE DAN202K-T-146	
D203	8-719-914-43	DIODE DAN202K-T-146	
D205	8-719-988-61	DIODE 1SS355TE-17	
D306	8-719-072-27	DIODE MA2Z748001S0	
D407	8-719-041-97	DIODE MA113- (TX)	
D408	8-719-041-97	DIODE MA113- (TX)	
D409	8-719-041-97	DIODE MA113- (TX)	
D410	8-719-041-97	DIODE MA113- (TX)	
D411	8-719-988-61	DIODE 1SS355TE-17	
D415	8-719-422-62	DIODE MA8062-L-TX	
D416	8-719-914-44	DIODE DAP202K-T-146	
D417	8-719-069-54	DIODE UDZS-TE17-5.1B	
D430	8-719-058-24	DIODE RB501V-40TE-17	
		< EARTH TERMINAL >	
* ET401	1-537-738-21	TERMINAL, EARTH	
* ET402	1-537-738-21	TERMINAL, EARTH	
* ET403	1-537-738-21	TERMINAL, EARTH	
		< FERRITE BEAD >	
FB101	1-414-766-22	INDUCTOR CHIP 0uH	
FB102	1-414-766-22	INDUCTOR CHIP 0uH	
FB103	1-414-766-22	INDUCTOR CHIP 0uH	
FB107	1-414-766-22	INDUCTOR CHIP 0uH	
FB108	1-414-766-22	INDUCTOR CHIP 0uH	
FB109	1-414-766-22	INDUCTOR CHIP 0uH	
FB201	1-414-230-22	INDUCTOR CHIP 0uH	
FB202	1-414-230-22	INDUCTOR CHIP 0uH	
FB203	1-414-230-22	INDUCTOR CHIP 0uH	
FB206	1-414-766-22	INDUCTOR CHIP 0uH	
FB208	1-414-766-22	INDUCTOR CHIP 0uH	
FB402	1-469-324-21	FERRITE 0uH	
FB405	1-469-324-21	FERRITE 0uH	
FB406	1-469-324-21	FERRITE 0uH	
FB407	1-469-324-21	FERRITE 0uH	
FB409	1-469-324-21	FERRITE 0uH	
FB410	1-469-324-21	FERRITE 0uH	
		< IC >	
IC101	8-759-667-63	IC LA7109-TLM	
IC102	8-759-667-18	IC PQ018EZ01ZP	
IC103	8-759-667-17	IC L79M05TLL-SONY-TL	
IC201	8-759-669-29	IC CXD9544MR	
IC205	7-759-667-85	IC CXD9545Q	
IC206	8-759-052-52	IC L78M05TLL-SONY-TL	
IC208	8-759-909-71	IC BA4558F-E2	
IC306	8-749-921-12	IC GP1F32T	
IC307	8-759-667-19	IC uPC29M08T-E1	
IC403	8-759-673-34	IC PST7030MT	
IC404	8-759-669-95	IC M38B57M6-147FP	
IC406	8-759-521-90	IC PQ05DZ5U	
IC407	8-759-671-84	IC AN77033SP- (E1)	
		< JACK >	
J101	1-793-445-11	JACK, PIN 3P (COMPONENT VIDEO OUT)	
J102	1-785-867-31	JACK, PIN 1P (VIDEO OUT)	
J103	1-694-484-21	TERMINAL, S (2P.V) (S VIDEO OUT)	
J201	1-793-525-21	JACK, PIN 2P (AUDIO OUT)	
J303	1-793-446-21	JACK, PIN 1P (COAXIAL)	
		< COIL >	
L401	1-408-978-21	INDUCTOR 47uH	
		< FLUORESCENT INDICATOR >	
ND401	1-517-972-11	INDICATOR TUBE, FLUORESCENT	
		< IC LINK >	
⚠PS401	1-532-679-00	LINK, IC (0.6A)	
⚠PS402	1-532-605-00	LINK, IC (0.4A)	
		< TRANSISTOR >	
Q106	8-729-421-19	TRANSISTOR UN2213-TX	
Q107	8-729-424-08	TRANSISTOR UN2111-TX	
Q203	8-729-023-22	TRANSISTOR 2SD2114KT146	
Q204	8-729-023-22	TRANSISTOR 2SD2114KT146	
Q205	8-729-421-19	TRANSISTOR UN2213-TX	
Q206	8-729-027-53	TRANSISTOR DTC124TKA-T146	
Q207	8-729-216-22	TRANSISTOR 2SB709A-QRS-TX	
Q311	8-729-230-72	TRANSISTOR 2SA1362-YG-EL	
Q313	8-729-230-49	TRANSISTOR 2SC2712-YG-TE85L	
Q401	8-729-808-42	TRANSISTOR 2SD1624-T-TD	
Q402	8-729-808-42	TRANSISTOR 2SD1624-T-TD	
Q908	8-729-029-47	TRANSISTOR DTA143ESA-TP	
Q909	8-729-029-68	TRANSISTOR DTC114TSA-TP	
		< RESISTOR >	
R101	1-216-296-91	SHORT 0	
R109	1-216-073-00	METAL CHIP 10K 5%	1/10W
R110	1-216-073-00	METAL CHIP 10K 5%	1/10W
R111	1-216-021-00	METAL CHIP 68 5%	1/10W
R112	1-216-021-00	METAL CHIP 68 5%	1/10W
R113	1-216-021-00	METAL CHIP 68 5%	1/10W
R115	1-216-021-00	METAL CHIP 68 5%	1/10W
R117	1-216-021-00	METAL CHIP 68 5%	1/10W
R119	1-216-021-00	METAL CHIP 68 5%	1/10W

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

AI-022

Ref. No.	Part No.	Description				Remark
R122	1-216-295-91	SHORT	0			
R147	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R148	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R149	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R150	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R151	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R152	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R201	1-216-025-91	RES-CHIP	100	5%	1/10W	
R202	1-216-295-91	SHORT	0			
R203	1-216-295-91	SHORT	0			
R204	1-216-025-91	RES-CHIP	100	5%	1/10W	
R205	1-216-033-00	METAL CHIP	220	5%	1/10W	
R206	1-216-033-00	METAL CHIP	220	5%	1/10W	
R210	1-216-295-91	SHORT	0			
R213	1-216-065-91	RES-CHIP	4.7K	5%	1/10W	
R229	1-216-071-00	METAL CHIP	8.2K	5%	1/10W	
R230	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R231	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R232	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R233	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R234	1-216-071-00	METAL CHIP	8.2K	5%	1/10W	
R235	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R236	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R237	1-216-053-00	METAL CHIP	1.5K	5%	1/10W	
R238	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R243	1-216-041-00	METAL CHIP	470	5%	1/10W	
R244	1-216-041-00	METAL CHIP	470	5%	1/10W	
R245	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R246	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R247	1-216-065-91	RES-CHIP	4.7K	5%	1/10W	
R248	1-216-065-91	RES-CHIP	4.7K	5%	1/10W	
R249	1-216-295-91	SHORT	0			
R250	1-216-295-91	SHORT	0			
R251	1-216-097-91	RES-CHIP	100K	5%	1/10W	
R253	1-216-041-00	METAL CHIP	470	5%	1/10W	
R255	1-216-041-00	METAL CHIP	470	5%	1/10W	
R256	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R257	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R258	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R260	1-216-071-00	METAL CHIP	8.2K	5%	1/10W	
R270	1-216-065-91	RES-CHIP	4.7K	5%	1/10W	
R271	1-216-071-00	METAL CHIP	8.2K	5%	1/10W	
R279	1-216-009-91	RES-CHIP	22	5%	1/10W	
R281	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R301	1-216-049-91	RES-CHIP	1K	5%	1/10W	
R369	1-216-295-91	SHORT	0			
R381	1-216-049-91	RES-CHIP	1K	5%	1/10W	
R382	1-216-295-91	SHORT	0			
R384	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R385	1-216-033-00	METAL CHIP	220	5%	1/10W	
R386	1-216-049-91	RES-CHIP	1K	5%	1/10W	
R391	1-216-025-91	RES-CHIP	100	5%	1/10W	
R392	1-216-021-00	METAL CHIP	68	5%	1/10W	
R394	1-216-033-00	METAL CHIP	220	5%	1/10W	
R401	1-216-027-00	METAL CHIP	120	5%	1/10W	
R402	1-216-101-00	METAL CHIP	150K	5%	1/10W	
R403	1-216-089-91	RES-CHIP	47K	5%	1/10W	
R405	1-216-295-91	SHORT	0			
R407	1-216-059-00	METAL CHIP	2.7K	5%	1/10W	
R409	1-216-295-91	SHORT	0			
R412	1-216-295-91	SHORT	0			
R413	1-216-013-00	METAL CHIP	33	5%	1/10W	
R414	1-216-025-91	RES-CHIP	100	5%	1/10W	
R415	1-216-295-91	SHORT	0			
R417	1-216-025-91	RES-CHIP	100	5%	1/10W	
R418	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R424	1-216-063-91	RES-CHIP	3.9K	5%	1/10W	
R432	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R434	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R435	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R436	1-216-295-91	SHORT	0			
R438	1-216-295-91	SHORT	0			
R439	1-216-015-00	METAL CHIP	39	5%	1/10W	
R444	1-216-065-91	RES-CHIP	4.7K	5%	1/10W	
R449	1-216-025-91	RES-CHIP	100	5%	1/10W	
R450	1-216-097-91	RES-CHIP	100K	5%	1/10W	
R451	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R452	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R453	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R454	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R455	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R456	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R457	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R458	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R459	1-216-025-91	RES-CHIP	100	5%	1/10W	
R460	1-216-025-91	RES-CHIP	100	5%	1/10W	
R461	1-216-025-91	RES-CHIP	100	5%	1/10W	
R462	1-216-025-91	RES-CHIP	100	5%	1/10W	
R463	1-216-025-91	RES-CHIP	100	5%	1/10W	
R464	1-216-025-91	RES-CHIP	100	5%	1/10W	
R465	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R466	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R469	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R473	1-216-037-00	METAL CHIP	330	5%	1/10W	
R475	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R477	1-216-295-91	SHORT	0			
R478	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R479	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R480	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R481	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R483	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R487	1-216-027-00	METAL CHIP	120	5%	1/10W	
R489	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R490	1-216-059-00	METAL CHIP	2.7K	5%	1/10W	
R491	1-216-063-91	RES-CHIP	3.9K	5%	1/10W	
R492	1-216-071-00	METAL CHIP	8.2K	5%	1/10W	
R493	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R494	1-216-093-91	RES-CHIP	68K	5%	1/10W	
R495	1-216-093-91	RES-CHIP	68K	5%	1/10W	
R496	1-216-093-91	RES-CHIP	68K	5%	1/10W	
R497	1-216-093-91	RES-CHIP	68K	5%	1/10W	
R498	1-216-093-91	RES-CHIP	68K	5%	1/10W	
R499	1-216-093-91	RES-CHIP	68K	5%	1/10W	
R568	1-216-295-91	SHORT	0			
R607	1-216-295-91	SHORT	0			
R608	1-216-295-91	SHORT	0			
R611	1-216-295-91	SHORT	0			
R614	1-216-295-91	SHORT	0			
R918	1-216-027-00	METAL CHIP	120	5%	1/10W	
R919	1-216-029-00	METAL CHIP	150	5%	1/10W	

Ref. No.	Part No.	Description			Remark
R920	1-216-049-91	RES-CHIP	1K	5%	1/10W
R921	1-216-089-91	RES-CHIP	47K	5%	1/10W
		< TRANSFORMER >			
T401	1-435-411-11	TRANSFORMER, DC-DC CONVERTER			
		< VIBRATOR >			
X401	1-781-853-21	VIBRATOR, CERAMIC (2MHz)			

Ref. No.	Part No.	Description			Remark
*	A-6065-552-A	FL-118 BOARD, COMPLETE			
		**********************			
					(Ref. No. 3,000 Series)
		< CONNECTOR >			
* CN414	1-564-723-11	PIN, CONNECTOR (SMALL TYPE) 7P			
		< DIODE >			
D413	8-719-056-06	DIODE SLR-342DCT32 (VES)			
D925	8-719-064-11	DIODE SPR-325MVW (ON/STANDBY)			
		< IC >			
IC401	8-749-018-22	IC RPM7040-H4			
		< SWITCH >			
S403	1-771-349-21	SWITCH, KEYBOARD (VES)			

Ref. No.	Part No.	Description			Remark
*	A-6065-553-A	FR-177 BOARD, COMPLETE			
		**********************			
					(Ref. No. 3,000 Series)
		< CONNECTOR >			
* CN411	1-564-721-11	PIN, CONNECTOR (SMALL TYPE) 5P			
		< RESISTOR >			
R410	1-249-428-11	CARBON	8.2K	5%	1/4W
R411	1-249-428-11	CARBON	8.2K	5%	1/4W
R420	1-249-424-11	CARBON	3.9K	5%	1/4W
R421	1-249-424-11	CARBON	3.9K	5%	1/4W
R426	1-249-422-11	CARBON	2.7K	5%	1/4W
R427	1-249-422-11	CARBON	2.7K	5%	1/4W
		< SWITCH >			
S405	1-771-349-21	SWITCH, KEYBOARD (RETURN)			
S407	1-771-349-21	SWITCH, KEYBOARD (▶▶I)			
S408	1-771-349-21	SWITCH, KEYBOARD (DISPLAY)			
S410	1-771-349-21	SWITCH, KEYBOARD (DVD MENU)			
S411	1-771-349-21	SWITCH, KEYBOARD (❚❚)			
S413	1-771-349-21	SWITCH, KEYBOARD (TITLE)			
S414	1-771-349-21	SWITCH, KEYBOARD (■)			
S415	1-771-349-21	SWITCH, KEYBOARD (▷)			
S417	1-771-349-21	SWITCH, KEYBOARD (OPEN/CLOSE ⏏)			
S418	1-771-349-21	SWITCH, KEYBOARD (I◀◀)			

Ref. No.	Part No.	Description			Remark
*	A-6065-564-A	MB-86 BOARD, COMPLETE			
		**********************			
					(Ref. No. 1,000 Series)
		< CAPACITOR >			
C101	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C102	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C103	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C104	1-126-209-11	ELECT CHIP	100uF	20%	4V
C105	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C106	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C107	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C108	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C109	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C110	1-162-916-11	CERAMIC CHIP	12PF	5%	50V
C111	1-126-209-11	ELECT CHIP	100uF	20%	4V
C112	1-162-915-11	CERAMIC CHIP	10PF	0.5PF	50V
C114	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C115	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C116	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C117	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C118	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C119	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C120	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C201	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C202	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C203	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C204	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C205	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C206	1-124-779-00	ELECT CHIP	10uF	20%	16V
C207	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C208	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C209	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C210	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C211	1-162-919-11	CERAMIC CHIP	22PF	5%	50V
C212	1-124-779-00	ELECT CHIP	10uF	20%	16V
C213	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C214	1-164-172-11	CERAMIC CHIP	0.0056uF	10%	25V
C215	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C216	1-164-172-11	CERAMIC CHIP	0.0056uF	10%	25V
C217	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C218	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C219	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C221	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C222	1-164-730-11	CERAMIC CHIP	0.0012uF	10%	50V
C223	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C224	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V
C225	1-164-217-11	CERAMIC CHIP	150PF	5%	50V
C226	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C227	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V
C228	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C229	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C230	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C231	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C232	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C233	1-124-779-00	ELECT CHIP	10uF	20%	16V
C234	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
C235	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V
C236	1-164-739-11	CERAMIC CHIP	560PF	5%	50V
C237	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V

Ref. No.	Part No.	Description				Remark
C238	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C239	1-162-969-11	CERAMIC CHIP	0.0068uF	10%	25V	
C301	1-110-563-11	CERAMIC CHIP	0.068uF	10%	16V	
C302	1-126-209-11	ELECT CHIP	100uF	20%	4V	
C303	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C304	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C305	1-162-927-11	CERAMIC CHIP	100PF	5%	50V	
C306	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C307	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C308	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C309	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C310	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C311	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C312	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C313	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C314	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C315	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C316	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C317	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C318	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C319	1-126-206-11	ELECT CHIP	100uF	20%	6.3V	
C320	1-126-206-11	ELECT CHIP	100uF	20%	6.3V	
C321	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C322	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C324	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C325	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C326	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C327	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C328	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C329	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C330	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C331	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V	
C332	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C401	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C405	1-126-204-11	ELECT CHIP	47uF	20%	16V	
C407	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C408	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C409	1-164-315-11	CERAMIC CHIP	470PF	5%	50V	
C410	1-162-921-11	CERAMIC CHIP	33PF	5%	50V	
C411	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C412	1-110-563-11	CERAMIC CHIP	0.068uF	10%	16V	
C413	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C414	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C415	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C416	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C417	1-115-467-11	CERAMIC CHIP	0.22uF	10%	10V	
C418	1-162-921-11	CERAMIC CHIP	33PF	5%	50V	
C419	1-110-563-11	CERAMIC CHIP	0.068uF	10%	16V	
C420	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V	
C421	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C422	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V	
C423	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V	
C424	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V	
C425	1-115-467-11	CERAMIC CHIP	0.22uF	10%	10V	
C426	1-164-315-11	CERAMIC CHIP	470PF	5%	50V	
C427	1-162-966-11	CERAMIC CHIP	0.0022uF	10%	50V	
C428	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V	
C429	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V	
C430	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C431	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	

Ref. No.	Part No.	Description				Remark
C433	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C434	1-164-315-11	CERAMIC CHIP	470PF	5%	50V	
C435	1-164-315-11	CERAMIC CHIP	470PF	5%	50V	
C436	1-164-677-11	CERAMIC CHIP	0.033uF	10%	16V	
C437	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C438	1-164-677-11	CERAMIC CHIP	0.033uF	10%	16V	
C439	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C440	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C441	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C442	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V	
C443	1-165-176-11	CERAMIC CHIP	0.047uF	10%	16V	
C444	1-126-205-11	ELECT CHIP	47uF	20%	6.3V	
C445	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C446	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C447	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C448	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V	
C449	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V	
C450	1-162-968-11	CERAMIC CHIP	0.0047uF	10%	50V	
C451	1-126-204-11	ELECT CHIP	47uF	20%	16V	
C452	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C453	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C454	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C455	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C456	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C457	1-115-467-11	CERAMIC CHIP	0.22uF	10%	10V	
C458	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C459	1-162-964-11	CERAMIC CHIP	0.001uF	10%	50V	
C460	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C462	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C463	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C465	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C466	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C501	1-124-779-00	ELECT CHIP	10uF	20%	16V	
C502	1-124-779-00	ELECT CHIP	10uF	20%	16V	
C503	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C504	1-124-779-00	ELECT CHIP	10uF	20%	16V	
C505	1-126-206-11	ELECT CHIP	100uF	20%	6.3V	
C506	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C507	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C508	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C509	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C510	1-124-779-00	ELECT CHIP	10uF	20%	16V	
C511	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C512	1-126-206-11	ELECT CHIP	100uF	20%	6.3V	
C513	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C514	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C515	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C516	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C517	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C518	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V	
C519	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C520	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C521	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C522	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C523	1-126-246-11	ELECT CHIP	220uF	20%	4V	
C524	1-126-204-11	ELECT CHIP	47uF	20%	16V	
C525	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C528	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C529	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	
C530	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V	

Ref. No.	Part No.	Description			Remark
C531	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C532	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C533	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C534	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C535	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C536	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C537	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C538	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C539	1-162-970-11	CERAMIC CHIP	0.01uF	10%	25V
C540	1-126-193-11	ELECT	1uF	20%	50V
C541	1-124-779-00	ELECT CHIP	10uF	20%	16V
C542	1-107-826-91	CERAMIC CHIP	0.1uF	10%	16V
		< CONNECTOR >			
* CN102	1-764-250-11	PIN, CONNECTOR (PC BOARD) 4P			
CN201	1-764-530-21	CONNECTOR, FFC/FPC (ZIF) 23P			
CN202	1-566-529-11	CONNECTOR, FPC (ZIF) 13P			
CN401	1-794-234-11	CONNECTOR, FFC/FPC 6P			
CN402	1-779-993-11	PIN, CONNECTOR (PWB) 5P			
CN501	1-794-324-11	CONNECTOR, BOARD TO BOARD 34P			
CN701	1-794-324-11	CONNECTOR, BOARD TO BOARD 34P			
		< DIODE >			
D101	8-719-071-34	DIODE RB521S-30-TE61			
D201	8-719-988-61	DIODE 1SS355TE-17			
		< FUSE >			
⚠F401	1-533-771-21	FUSE (SMD) (0.8A)			
⚠F402	1-533-771-21	FUSE (SMD) (0.8A)			
		< FERRITE BEAD >			
FB102	1-469-784-11	FERRITE	0uH		
FB104	1-469-784-11	FERRITE	0uH		
FB105	1-469-784-11	FERRITE	0uH		
FB107	1-469-784-11	FERRITE	0uH		
FB109	1-469-784-11	FERRITE	0uH		
FB110	1-469-784-11	FERRITE	0uH		
FB501	1-469-324-21	FERRITE	0uH		
FB502	1-469-324-21	FERRITE	0uH		
FB503	1-469-324-21	FERRITE	0uH		
FB504	1-469-324-21	FERRITE	0uH		
FB505	1-469-324-21	FERRITE	0uH		
FB506	1-469-324-21	FERRITE	0uH		
FB507	1-469-324-21	FERRITE	0uH		
FB508	1-216-797-11	METAL CHIP	10	5%	1/16W
		< FILTER >			
FL101	1-234-177-21	FILTER, CHIP EMI			
FL102	1-234-177-21	FILTER, CHIP EMI			
FL103	1-234-177-21	FILTER, CHIP EMI			
FL201	1-234-177-21	FILTER, CHIP EMI			
FL301	1-234-177-21	FILTER, CHIP EMI			
FL302	1-234-177-21	FILTER, CHIP EMI			
FL303	1-234-177-21	FILTER, CHIP EMI			
FL402	1-234-177-21	FILTER, CHIP EMI			
FL501	1-234-177-21	FILTER, CHIP EMI			
FL502	1-234-177-21	FILTER, CHIP EMI			

Ref. No.	Part No.	Description			Remark
FL503	1-234-177-21	FILTER, CHIP EMI			
FL504	1-234-177-21	FILTER, CHIP EMI			
FL505	1-234-177-21	FILTER, CHIP EMI			
FL506	1-234-177-21	FILTER, CHIP EMI			
FL507	1-233-893-21	FILTER, CHIP EMI			
FL508	1-234-177-21	FILTER, CHIP EMI			
		< IC >			
IC101	8-759-667-20	IC BR9080F-E2			
IC102	8-759-663-92	IC MB91107PFV-G-BND			
IC103	8-759-427-92	IC PST9126NL			
IC105	8-759-667-86	IC CXD9572N-E2			
IC106	8-759-681-81	IC MR27V1602D-C8TPZ060			
IC201	8-759-567-24	IC SSI33P3722			
IC301	8-759-486-55	IC NJM2370U33-TE2			
IC302	8-759-666-84	IC CXD9576R			
IC303	8-759-643-10	IC GM71V18160CT-6TR			
IC401	8-759-660-88	IC LA6553-TE-L			
IC402	8-759-660-88	IC LA6553-TE-L			
IC403	8-759-338-78	IC BA10324AFV-E2			
IC404	8-759-660-87	IC CXD9569R			
IC502	8-752-399-55	IC CXD1932Q			
IC503	8-759-486-55	IC NJM2370U33-TE2			
IC504	8-759-573-19	IC MT48LC1M16A1TG-7S			
IC505	8-759-573-19	IC MT48LC1M16A1TG-7S			
IC506	8-759-669-28	IC PQ1R18			
		< COIL >			
L201	1-412-031-11	INDUCTOR CHIP	47uH		
		< TRANSISTOR >			
Q201	8-729-820-86	TRANSISTOR	2SB1121-T-TD		
Q203	8-729-402-42	TRANSISTOR	UN5213-TX		
		< RESISTOR >			
R002	1-216-801-11	METAL CHIP	22	5%	1/16W
R009	1-216-821-11	METAL CHIP	1K	5%	1/16W
R012	1-216-833-91	RES-CHIP	10K	5%	1/16W
R013	1-216-833-91	RES-CHIP	10K	5%	1/16W
R014	1-216-805-11	METAL CHIP	47	5%	1/16W
R015	1-216-809-11	METAL CHIP	100	5%	1/16W
R016	1-216-821-11	METAL CHIP	1K	5%	1/16W
R017	1-216-821-11	METAL CHIP	1K	5%	1/16W
R019	1-216-817-11	METAL CHIP	470	5%	1/16W
R020	1-216-295-91	SHORT	0		
R021	1-216-296-91	SHORT	0		
R041	1-216-797-11	METAL CHIP	10	5%	1/16W
R042	1-216-797-11	METAL CHIP	10	5%	1/16W
R101	1-216-833-91	RES-CHIP	10K	5%	1/16W
R102	1-216-833-91	RES-CHIP	10K	5%	1/16W
R104	1-216-801-11	METAL CHIP	22	5%	1/16W
R105	1-216-797-11	METAL CHIP	10	5%	1/16W
R114	1-216-845-11	METAL CHIP	100K	5%	1/16W
R118	1-216-833-91	RES-CHIP	10K	5%	1/16W
R120	1-216-833-91	RES-CHIP	10K	5%	1/16W
R121	1-216-864-11	METAL CHIP	0	5%	1/16W
R123	1-216-827-11	METAL CHIP	3.3K	5%	1/16W

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

MB-86

Ref. No.	Part No.	Description			Remark
R125	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R127	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R129	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R130	1-216-833-91	RES-CHIP	10K	5%	1/16W
R131	1-216-833-91	RES-CHIP	10K	5%	1/16W
R136	1-216-833-91	RES-CHIP	10K	5%	1/16W
R138	1-216-797-11	METAL CHIP	10	5%	1/16W
R139	1-216-797-11	METAL CHIP	10	5%	1/16W
R140	1-216-797-11	METAL CHIP	10	5%	1/16W
R154	1-216-864-11	METAL CHIP	0	5%	1/16W
R158	1-216-797-11	METAL CHIP	10	5%	1/16W
R159	1-216-821-11	METAL CHIP	1K	5%	1/16W
R161	1-216-833-91	RES-CHIP	10K	5%	1/16W
R164	1-216-821-11	METAL CHIP	1K	5%	1/16W
R166	1-216-833-91	RES-CHIP	10K	5%	1/16W
R167	1-216-833-91	RES-CHIP	10K	5%	1/16W
R168	1-216-833-91	RES-CHIP	10K	5%	1/16W
R169	1-216-833-91	RES-CHIP	10K	5%	1/16W
R170	1-216-833-91	RES-CHIP	10K	5%	1/16W
R171	1-216-833-91	RES-CHIP	10K	5%	1/16W
R172	1-216-833-91	RES-CHIP	10K	5%	1/16W
R173	1-216-833-91	RES-CHIP	10K	5%	1/16W
R174	1-216-833-91	RES-CHIP	10K	5%	1/16W
R175	1-216-833-91	RES-CHIP	10K	5%	1/16W
R176	1-216-833-91	RES-CHIP	10K	5%	1/16W
R183	1-216-833-91	RES-CHIP	10K	5%	1/16W
R184	1-216-801-11	METAL CHIP	22	5%	1/16W
R188	1-216-833-91	RES-CHIP	10K	5%	1/16W
R190	1-216-833-91	RES-CHIP	10K	5%	1/16W
R191	1-216-833-91	RES-CHIP	10K	5%	1/16W
R195	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R201	1-216-815-11	METAL CHIP	330	5%	1/16W
R202	1-216-809-11	METAL CHIP	100	5%	1/16W
R203	1-216-809-11	METAL CHIP	100	5%	1/16W
R204	1-216-837-11	METAL CHIP	22K	5%	1/16W
R206	1-216-803-11	METAL CHIP	33	5%	1/16W
R207	1-216-803-11	METAL CHIP	33	5%	1/16W
R208	1-216-841-11	METAL CHIP	47K	5%	1/16W
R209	1-216-797-11	METAL CHIP	10	5%	1/16W
R210	1-216-820-11	METAL CHIP	820	5%	1/16W
R211	1-216-811-11	METAL CHIP	150	5%	1/16W
R214	1-216-834-11	METAL CHIP	12K	5%	1/16W
R215	1-216-813-11	METAL CHIP	220	5%	1/16W
R217	1-216-861-11	METAL CHIP	2.2M	5%	1/16W
R222	1-216-833-91	RES-CHIP	10K	5%	1/16W
R223	1-216-833-91	RES-CHIP	10K	5%	1/16W
R224	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R225	1-216-833-91	RES-CHIP	10K	5%	1/16W
R301	1-218-879-11	METAL CHIP	22K	0.5%	1/16W
R302	1-218-831-11	METAL CHIP	220	0.5%	1/16W
R303	1-218-883-11	METAL CHIP	33K	0.5%	1/16W
R304	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R305	1-216-838-11	METAL CHIP	27K	5%	1/16W
R306	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R307	1-216-822-11	METAL CHIP	1.2K	5%	1/16W
R309	1-216-809-11	METAL CHIP	100	5%	1/16W
R310	1-216-833-91	RES-CHIP	10K	5%	1/16W
R311	1-216-845-11	METAL CHIP	100K	5%	1/16W
R313	1-218-855-11	METAL CHIP	2.2K	0.5%	1/16W
R314	1-218-847-11	METAL CHIP	1K	0.5%	1/16W
R315	1-218-871-11	METAL CHIP	10K	0.5%	1/16W
R316	1-218-871-11	METAL CHIP	10K	0.5%	1/16W
R317	1-216-833-91	RES-CHIP	10K	5%	1/16W
R318	1-216-833-91	RES-CHIP	10K	5%	1/16W
R319	1-218-853-11	METAL CHIP	1.8K	0.5%	1/16W
R320	1-216-833-91	RES-CHIP	10K	5%	1/16W
R321	1-216-813-11	METAL CHIP	220	5%	1/16W
R327	1-216-809-11	METAL CHIP	100	5%	1/16W
R338	1-216-801-11	METAL CHIP	22	5%	1/16W
R401	1-216-833-91	RES-CHIP	10K	5%	1/16W
R402	1-216-833-91	RES-CHIP	10K	5%	1/16W
R403	1-216-833-91	RES-CHIP	10K	5%	1/16W
R404	1-216-821-11	METAL CHIP	1K	5%	1/16W
R405	1-216-821-11	METAL CHIP	1K	5%	1/16W
R406	1-216-821-11	METAL CHIP	1K	5%	1/16W
R407	1-216-797-11	METAL CHIP	10	5%	1/16W
R408	1-216-311-00	METAL CHIP	6.8	5%	1/10W
R409	1-216-797-11	METAL CHIP	10	5%	1/16W
R411	1-216-835-11	METAL CHIP	15K	5%	1/16W
R412	1-216-797-11	METAL CHIP	10	5%	1/16W
R415	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R416	1-216-847-11	METAL CHIP	150K	5%	1/16W
R417	1-216-843-11	METAL CHIP	68K	5%	1/16W
R418	1-216-847-11	METAL CHIP	150K	5%	1/16W
R419	1-216-835-11	METAL CHIP	15K	5%	1/16W
R420	1-216-835-11	METAL CHIP	15K	5%	1/16W
R421	1-216-836-11	METAL CHIP	18K	5%	1/16W
R422	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R423	1-216-833-91	RES-CHIP	10K	5%	1/16W
R424	1-216-844-11	METAL CHIP	82K	5%	1/16W
R425	1-216-845-11	METAL CHIP	100K	5%	1/16W
R426	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R427	1-216-835-11	METAL CHIP	15K	5%	1/16W
R428	1-216-841-11	METAL CHIP	47K	5%	1/16W
R429	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R436	1-216-833-91	RES-CHIP	10K	5%	1/16W
R443	1-216-844-11	METAL CHIP	82K	5%	1/16W
R444	1-216-843-11	METAL CHIP	68K	5%	1/16W
R445	1-216-829-11	METAL CHIP	4.7K	5%	1/16W
R446	1-216-825-11	METAL CHIP	2.2K	5%	1/16W
R447	1-216-835-11	METAL CHIP	15K	5%	1/16W
R448	1-216-835-11	METAL CHIP	15K	5%	1/16W
R449	1-216-832-11	METAL CHIP	8.2K	5%	1/16W
R450	1-216-833-91	RES-CHIP	10K	5%	1/16W
R451	1-216-821-11	METAL CHIP	1K	5%	1/16W
R452	1-216-797-11	METAL CHIP	10	5%	1/16W
R454	1-216-311-00	METAL CHIP	6.8	5%	1/10W
R458	1-216-833-91	RES-CHIP	10K	5%	1/16W
R459	1-216-833-91	RES-CHIP	10K	5%	1/16W
R460	1-216-845-11	METAL CHIP	100K	5%	1/16W
R463	1-216-821-11	METAL CHIP	1K	5%	1/16W
R464	1-218-899-11	METAL CHIP	150K	0.5%	1/16W
R465	1-216-821-11	METAL CHIP	1K	5%	1/16W
R466	1-216-821-11	METAL CHIP	1K	5%	1/16W
R467	1-216-821-11	METAL CHIP	1K	5%	1/16W
R468	1-216-821-11	METAL CHIP	1K	5%	1/16W
R469	1-218-889-11	METAL CHIP	56K	0.5%	1/16W
R470	1-218-850-11	METAL CHIP	1.3K	0.5%	1/16W
R471	1-218-899-11	METAL CHIP	150K	0.5%	1/16W
R472	1-218-847-11	METAL CHIP	1K	0.5%	1/16W

Ref. No.	Part No.	Description			Remark
R473	1-218-850-11	METAL CHIP	1.3K	0.5%	1/16W
R474	1-218-889-11	METAL CHIP	56K	0.5%	1/16W
R475	1-216-797-11	METAL CHIP	10	5%	1/16W
R476	1-216-813-11	METAL CHIP	220	5%	1/16W
R477	1-216-821-11	METAL CHIP	1K	5%	1/16W
R478	1-216-836-11	METAL CHIP	18K	5%	1/16W
R479	1-216-836-11	METAL CHIP	18K	5%	1/16W
R480	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R481	1-216-824-11	METAL CHIP	1.8K	5%	1/16W
R482	1-216-803-11	METAL CHIP	33	5%	1/16W
R483	1-216-834-11	METAL CHIP	12K	5%	1/16W
R484	1-216-834-11	METAL CHIP	12K	5%	1/16W
R485	1-216-817-11	METAL CHIP	470	5%	1/16W
R486	1-218-847-11	METAL CHIP	1K	0.5%	1/16W
R487	1-218-847-11	METAL CHIP	1K	0.5%	1/16W
R488	1-218-847-11	METAL CHIP	1K	0.5%	1/16W
R489	1-218-847-11	METAL CHIP	1K	0.5%	1/16W
R490	1-216-817-11	METAL CHIP	470	5%	1/16W
R491	1-216-821-11	METAL CHIP	1K	5%	1/16W
R492	1-216-817-11	METAL CHIP	470	5%	1/16W
R493	1-216-817-11	METAL CHIP	470	5%	1/16W
R494	1-216-817-11	METAL CHIP	470	5%	1/16W
R495	1-216-797-11	METAL CHIP	10	5%	1/16W
R496	1-216-821-11	METAL CHIP	1K	5%	1/16W
R497	1-216-821-11	METAL CHIP	1K	5%	1/16W
R501	1-216-809-11	METAL CHIP	100	5%	1/16W
R502	1-216-833-91	RES-CHIP	10K	5%	1/16W
R503	1-218-831-11	METAL CHIP	220	0.5%	1/16W
R504	1-218-831-11	METAL CHIP	220	0.5%	1/16W
R505	1-218-831-11	METAL CHIP	220	0.5%	1/16W
R506	1-218-831-11	METAL CHIP	220	0.5%	1/16W
R507	1-218-831-11	METAL CHIP	220	0.5%	1/16W
R508	1-218-831-11	METAL CHIP	220	0.5%	1/16W
R517	1-216-833-91	RES-CHIP	10K	5%	1/16W
R518	1-216-822-11	METAL CHIP	1.2K	5%	1/16W
R526	1-216-827-11	METAL CHIP	3.3K	5%	1/16W
R527	1-216-864-11	METAL CHIP	0	5%	1/16W
R529	1-216-833-91	RES-CHIP	10K	5%	1/16W
R530	1-216-833-91	RES-CHIP	10K	5%	1/16W
R540	1-216-864-11	METAL CHIP	0	5%	1/16W
R542	1-216-864-11	METAL CHIP	0	5%	1/16W
R701	1-216-864-11	METAL CHIP	0	5%	1/16W
R750	1-216-864-11	METAL CHIP	0	5%	1/16W
R751	1-216-864-11	METAL CHIP	0	5%	1/16W
R752	1-216-864-11	METAL CHIP	0	5%	1/16W
R753	1-216-864-11	METAL CHIP	0	5%	1/16W
R754	1-216-864-11	METAL CHIP	0	5%	1/16W
R755	1-216-864-11	METAL CHIP	0	5%	1/16W
R771	1-216-864-11	METAL CHIP	0	5%	1/16W
R785	1-216-864-11	METAL CHIP	0	5%	1/16W
		< COMPOSITION CIRCUIT BLOCK >			
* RB101	1-233-270-11	NETWORK, RES (8 GANG) 10K			
* RB102	1-233-270-11	NETWORK, RES (8 GANG) 10K			
		< VARIABLE RESISTOR >			
RV501	1-223-583-11	RES, ADJ, CARBON 1K			

Ref. No.	Part No.	Description		Remark
		< VIBRATOR >		
X101	1-781-185-21	VIBRATOR, CERAMIC (12.5MHz)		
X102	1-781-867-21	VIBRATOR, CRYSTAL (27MHz)		

*	A-6066-016-A	MS-48 BOARD, COMPLETE		
		**********************		
				(Ref. No. 2,000 Series)
		< CONNECTOR >		
CN001	1-794-197-11	CONNECTOR, FFC/FPC 6P		
		< SWITCH >		
S001	1-771-562-11	SWITCH, LEVER (CHUCK SENSOR)		
S002	1-762-386-11	SWITCH, PUSH (TRAY SENSOR)		

*	1-468-506-21	POWER BLOCK (HS16S9U)		
		**********************		
				(Ref.No. 5,000 Series)
		< CAPACITOR >		
C211	1-107-895-11	ELECT	330uF	35V
C213	1-126-947-11	ELECT	47uF	35V
C301	1-126-960-11	ELECT	1uF	50V
C311	1-107-895-11	ELECT	330uF	35V
C313	1-126-947-11	ELECT	47uF	35V
C315	1-126-947-11	ELECT	47uF	35V
C511	1-107-911-11	ELECT	220uF	35V
C513	1-126-947-11	ELECT	47uF	35V
C611	1-107-895-11	ELECT	330uF	35V
C613	1-126-948-11	ELECT	100uF	35V
		< DIODE >		
D101	9-885-000-79	DIODE S1WBA60		
D104	8-719-983-00	DIODE MTZJ-T-77-2.4B		
D105	8-719-991-33	DIODE 1SS133T-77		
D211	8-719-027-43	DIODE S2L20U		
D212	8-719-160-87	DIODE RD33FB2		
D311	8-719-018-83	DIODE D2S4M		
D315	8-719-991-33	DIODE 1SS133T-77		
D511	8-719-032-12	DIODE D1NS6		
D611	8-719-500-50	DIODE D3S4M		
D613	8-719-991-33	DIODE 1SS133T-77		
D615	8-719-064-11	DIODE SPR-325MVW		
		< FUSE >		
⚠F101	1-532-388-31	FUSE (2.0A/125V)		
		< IC >		
IC301	8-759-420-19	IC AN1431T		
		< IC LINK >		
⚠P611	1-532-593-11	LINK, IC (2A)		
⚠P612	1-532-593-11	LINK, IC (2A)		

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

POWER BLOCK

Ref. No.	Part No.	Description	Remark
		< PHOTO COUPLER >	
⚠PC101	8-749-923-91	PHOTO COUPLER PS2501	
		< TRANSISTOR >	
Q102	8-729-024-00	TRANSISTOR 2SC3377	
Q312	8-729-901-41	TRANSISTOR 2SC1740S	
Q611	8-729-921-42	TRANSISTOR 2SA1679	
Q615	8-729-029-46	TRANSISTOR DTA143ESA	
Q621	8-729-029-68	TRANSISTOR DTC114TSA	
Q711	8-729-029-46	TRANSISTOR DTA143ESA	

MISCELLANEOUS
****

Ref. No.	Part No.	Description	Remark
7	1-771-913-11	SWITCH, TACTILE	
12	1-418-990-11	COMMANDER, STANDARD (RMT-D116A)	
110	1-792-457-11	CABLE, FLEXIBLE FLAT (FMM-33)	
⚠114	1-792-211-41	CORD, POWER	
⚠220	A-6062-397-A	OPTICAL PICK-UP KHM-220AAA	
M001	1-541-632-11	MOTOR, DC (LOADING)	

****
HARDWARE LIST
****

Ref. No.	Part No.	Description	Remark
#1	7-685-646-79	SCREW +BVTP 3X8 TYPE2 N-S	
#2	7-685-647-79	SCREW +BVTP 3X10 TYPE2 N-S	
#3	7-621-775-10	SCREW +B 2.6X4	
#4	7-685-648-79	SCREW +BVTP 3X12 TYPE2 IT-3	

ACCESSORIES & PACKING MATERIALS
****

Part No.	Description
1-418-990-11	COMMANDER, STANDARD (RMT-D116A)
1-575-334-11	CORD, CONNECTION (STEREO AV CABLE 1.5m)
3-053-633-01	COVER, BATTERY (for RMT-D116A)
3-062-657-11	MANUAL, INSTRUCTION (ENGLISH)

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

9-921-769-11

Sony Corporation
Network Entertainment Group

2000F053012-1F
Printed in Japan © 2000. 6
Published by Quality Assurance Dept.